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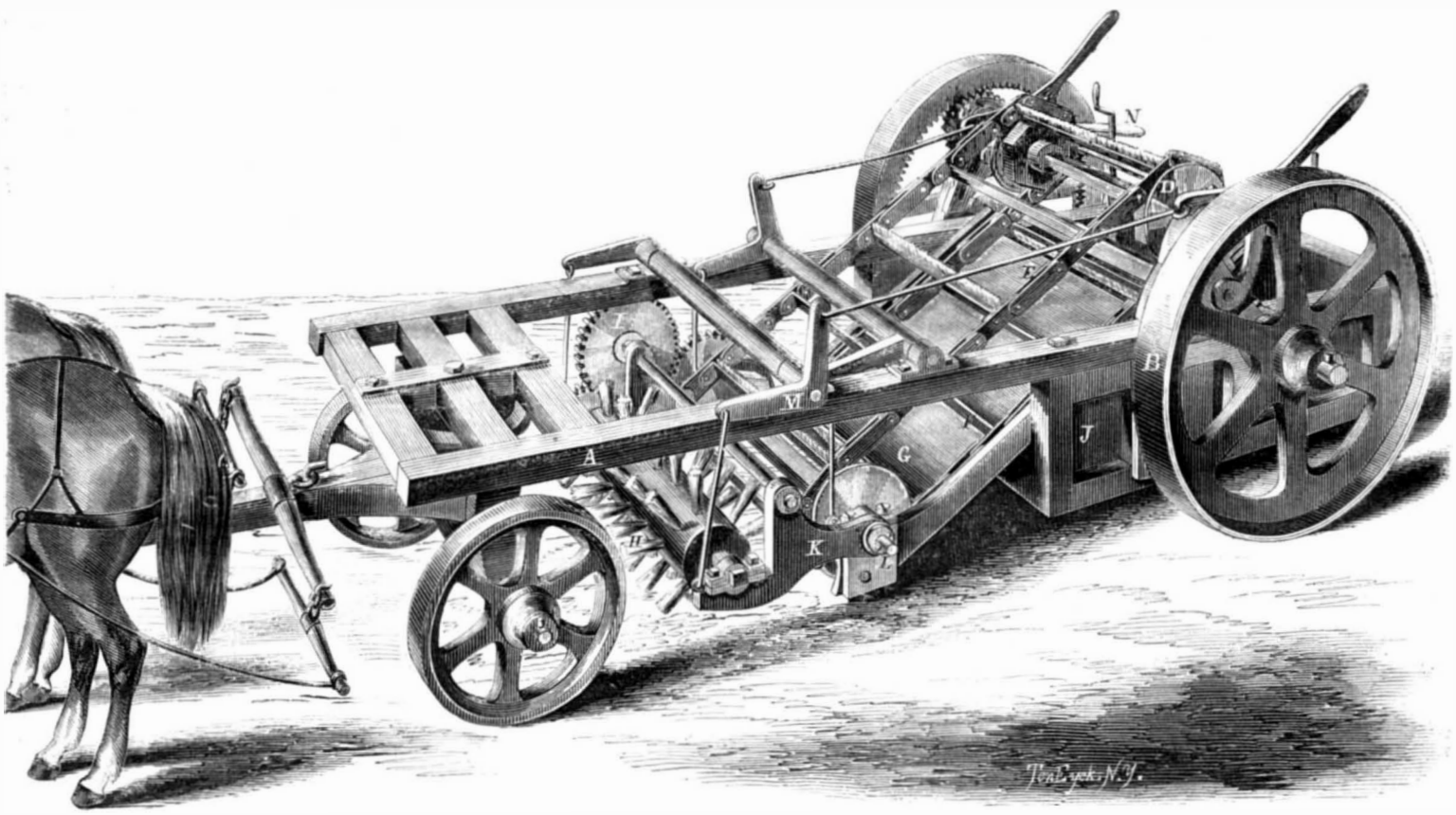
Improved Street-sweeping Machine.

It would seem eminently proper that the cleaning of city streets should be done in a systematic and thorough manner, by the aid of machinery instead of by slow and inefficient hand labor, which now characterizes the present mode of cleaning. The advantage of such a plan over the one now practiced would be great, and once thoroughly inaugurated, would become permanent.

The machine illustrated herewith is intended to clean streets, and is simple in design and operation. The principal parts are well shown in the engraving; a, being the frame which carries the whole machine. To this frame the wheels, B, are attached, one of them being toothed in its inner circumference so that a pinion, C, is revolved as the machine progresses. By revolving, this pinion drives a set of rag or cham wheels, D, over which the chains, E, run; these chains have scrapers, F, stretched between them, and then run over another set of similar wheels at the bottom; so that in this way an endless scraping and brushing device is produced which acts on the platform, G

It will be seen on referring to the engraving that there is a brush, H, in front of the inclined platform. This brush is driven by the gears, I, from the rag wheels before spoken of, as it rolls and acts on the pavement in advance of it and throws the dirt upon the platform behind, from whence it is removed by the scrapers into the box, J, at the rear end, which is provided with facilities for dumping the load when full. The adjustment of the brush is obtained by hang ing its bearings in a frame, K, which swings on the shaft, L, the rods and cranks, M, serving as agents to raise and lower said frame while the machine is at work without throwing it out of gear, or otherwise suspending its operation.

The handle, N, acts on the pinion so as to slip it out of gear when the machine is to proceed from one place to another. The inclined flat frame is also furnished with a plan similar to that on the brush shaft for elevating its lower or working edge. These details are the principal ones and the combination of them gives a simple and desirable machine for the purpose required of it. A patent is ordered to issue on this machine to Daniel Sargent of Inagua, one of the Bahama Islands. For further information address the inventor, care of John Bacon, 53 South St., N. Y.



SARGENT'S STREET-SWEEPING MACHINE.

Snow Skates In California.

Says a Californian Journal, "Large numbers climb the sides of the mountains in sight of town, almost daily, for the purpose of sliding down, and it is truly wonderful to see with what speed and precision they can descend. The Norwegians, of course, take the lead, for they have been accustomed to the use of this kind of snow-skate from childhood. That those who have never seen a pair of snow-skates may understand something of them I will give a description of how they are constructed. They consist each of a strip of tough wood about 12 feet long by from 4 to 5 inches in width, and about 1½ inches thick in the center, tapering to about half that thickness at the ends. The front end is turned up very similar to a sled runner. In the center, a cleet or a few thicknesses of leather are nailed across, on which stands the hollow of the foot, and a strap about three inches in width passes over the toe of the boot, and is fastened to the sides of the skate. The parties using them usually carry a stick about 8 feet long, with which to balance themselves. Beginners can get along quite well on level ground, but when they attempt running down hill it is quite difficult, and requires considerable practice to keep on the feet. When one loses his balance he is plunged into the snow perhaps nearly out of sight, and is greeted with a laugh from the lookers on. His skates sometimes go on swiftly down the hill and he is left in a helpless condition until some one takes them back to him. Parties thus falling frequently end entirely over and sometimes go from thirty to forty feet from where they fell before stopping.

Singular Practice of English Engineers.

English engineers have peculiar tastes and habits. If one may judge from the sneers and recriminations they indulge in toward each other, professional courtesy is not very high among them. Some time ago a Mr. Burgh having designed a plan for a very awkward and uncouth steam engine for twin-screw propulsion, sent a drawing of the same to the *London Engineer*. That journal published an engraving of the drawing, whereupon engineers, both great and small, pitched into the design, and from denouncing that became personal, and are at this date discussing each other's professional abilities, and the educational opportunities they have respectively enjoyed—dignified pastime certainly. There is no accounting for tastes, as was sagely remarked by a venerable lady on one occasion.

Owing to the four days' suspension of business for the solemnities following the death of the beloved and respected chief magistrate of the nation, there has been some delay in getting this and the previous number of our paper to press. After this we hope to be able to mail the paper on the same day as formerly.

The Farmers Club says that hay may safely go through the sweating process after being baled in the Beater Press, and consequently tolerably ripe grass might be cut in the midlde of a hot day and baled immediately, and prove more palatable and nutritious than that overcured in the usual way.

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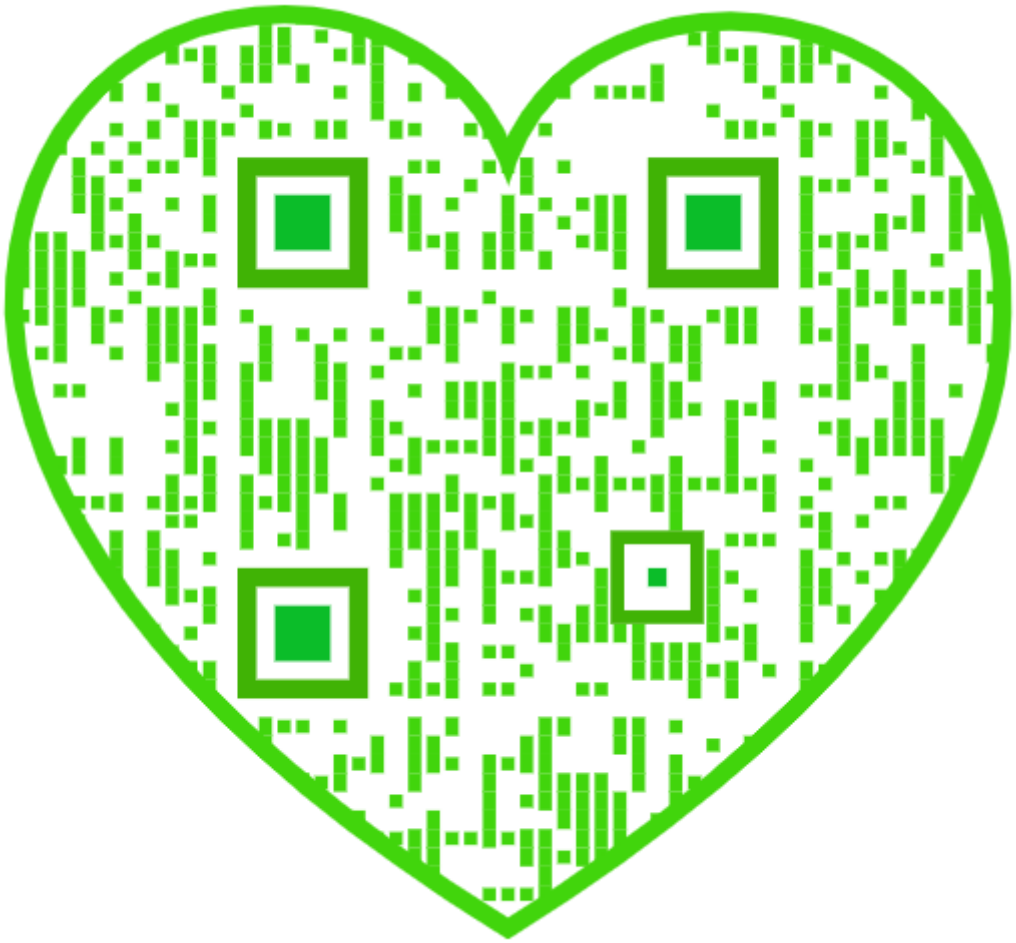

ANOTHER IMPROVEMENT IN PHOTOGRAPHY--THE SIMPSONTYPE.

At a recent meeting of the London Photographic Society, reported in our excellent cotemporary, the *Photographic News*, Mr. G. Wharton Simpson read a paper illustrative of a new method of printing, discovered by him, which attracted great attention.

Mr. Simpson's discovery consists in the use of chloride of silver in collodion as a sensitizer of paper for photographic printing. The following are Mr. Simpson's suggestions for using his process, which he generously presents to the public, no patent being taken:—

THE COLLODION.

To obtain the best results, the character of the plain collodion is important. The film should not be too horny, as besides giving a degree of gloss offensive to some tastes, it is at times inclined to blister, and leave the paper. It should not possess too much of the powdery character, as in that case it is apt to dry flat and dead, although such a collodion generally adheres well to the paper. Above all, it must dry perfectly transparent, without the slightest opalescence or opacity. If the film be in any degree opaque, the print will lose in brilliancy, and will, on drying, appear to have a slight film or bloom upon it. Before using any collodion for printing purposes, I pour a drop on a plate of glass and allow it to dry. If, when dry, it be perfectly transparent, so that it is not easy to discover it on the glass, it will answer admirably. If it dry at all opaque or opalescent, I reject it at once. The soluble cotton most suitable for the purpose is really that best suited for giving a good negative collodion.

THE SENSITIVE SALTS.

With an ordinary good negative I have found that about one grain and a half of chloride of calcium and seven grains and a half of nitrate of silver in each ounce of collodion has given the best results as regards sensitiveness, delicacy and vigor. With a less proportion of nitrate of silver, greater softness and less vigor are obtained. With a larger proportion of both salts, the paper is a little more sensitive, but no other advantage is gained.

There are various modes of dissolving the sensitive salts in collodion, but I have found the following the most convenient:—In each ounce of methylated spirit I find I can dissolve conveniently sixteen grains of nitrate of silver by triturating the salt in a mortar, then adding the spirit a little at a time and pouring it off until all is dissolved. I keep a stock bottle of this alcoholic solution of nitrate of silver. To an ounce of this I add an ounce of ether and the necessary proportion of soluble cotton, and then add of a solution of the chloride in alcohol, containing sixteen grains to the ounce, three-fourths of a drachm, containing one grain and a half. This is added, a few drops at a time, the collodion being shaken between each addition. In a few minutes the decomposition is complete, and something like an emulsion of chloride of silver is formed, with excess of about three grains of nitrate of silver in each ounce. This is immediately ready for use, and, so far as a few months' experience is suggestive, will keep indefinitely.

THE PAPER.

An absolute decision as to the most suitable paper will require a much wider experience than I have as yet had. I have tried various samples both with and without previous preparation. I have used Whatman's drawing paper, Turner's Calotype paper, Bristol-board, common writing paper, ordinary Saxe and Rive paper, and the paper prepared with arrowroot for the Wothlytype process by Mr. Sanford, and by the United Association of Photography. I have obtained some good results with all; but on the whole I decidedly like the last mentioned best. The chief disadvantage that I found in using unprepared paper has only been found with certain samples of collodion, and has consisted in imperfect adhesion of the film, giving the surface of finished prints a mottled effect. It is possible that some addition to the collodion may be found a remedy for this.

TONING, FIXING, ETC.

The paper having been coated, dried and exposed, the toning and fixing may be effected in the usual manner, with this difference, that a very much smaller proportion of the silver salts being present, a much weaker fixing solution may be used with advantage. The prints I exhibit to-night have been treated in various ways, and many of them have been toned and fixed in the mixed bath of chloride of gold and sulphocyanide of ammonium, which I first recommended for uranium prints. Others in the acetate bath, others in the lime bath, others with the *sel d'or*, and some have been fixed with hyposulphite of soda, and some have been fixed with sulpho-cyanide of ammonium. As you will perceive, every variety of tone is possible, from a warm sepia tint to deep black.

I will now add one or two words on certain characteristics of the prints and the process, in which they vary from others.

The image in most cases appears to be entirely in the collodion film, and not in the paper at all. In some cases where I have removed the film, there have been no traces of an image underneath; and in other cases, on removing the collodion film, a very faint image only has been found on the paper, not nearly equal in depth to that found on removing the film of albumen from an albumenized paper print.

There is no insoluble silver compound formed like that formed with albumen. A properly fixed and washed print by this process when tested with hydrosulphate of ammonia gives no indication of the presence of silver in the whites as an albumenized print does. There is, therefore, good reason to believe in the permanency of these prints.

The manipulations are very simple, and the materials always ready without any preparation. Should it be found on experience that collodion is not desirable in printing on a commercial scale, this is at least a process which will be found useful to amateurs, and for many incidental purposes unnecessary to detail here.

I do not here enter into its various applications besides that of producing prints on paper, but I may mention that I have found it excellent for producing prints on painters' canvas, on opal glass, etc. The specimens I exhibit have been produced under the difficulties of very dull weather, and with the limited attention my own more immediate duties have permitted me to give to lengthened experiments.

At the conclusion of the paper, Mr. Simpson exhibited about fifty specimens, including card and whole plate portraits, and landscapes of various sizes, with a great variety of warm tones of the sepia and bistre tints, and various purple and black tints. There were examples also of many gradations of vigor from extreme softness to great brilliancy. The prints were examined with much interest, and elicited many expressions of admiration from the members.

Mr. H. P. Robinson said he had had opportunities of seeing a good deal of printing carried on by Mr. Simpson's process. What struck him as one of its special advantages was, that good results could be produced from almost any class of negative. He had seen brilliant and vigorous prints taken from negatives so weak and thin that he should have considered them worthless for ordinary silver printing; and he had seen soft and delicate results from what many printers would consider hard, over-developed negatives. And this, he thought, was its great advantage over the Wothlytype process, which, he believed, required a considerable amount of density in the negative. There was another thing worth the attention of photographers. The germs of many good processes had been suggested, but these germs being nipped in the bud by patents, have never had the chance of coming to full maturity, the public generally having no great interest in improving the property of an individual. The Simpsontype, he was happy to find, was given freely to photographers, without any reservation whatever. So that whatever they could make of it by experiment belongs to themselves as common property. The credit of the discovery and the thanks of photographers belongs to the inventor—the profit to the public.

Mr. Simpson, in reply to Mr. J. Williams, said he had used alcoholic solutions throughout. He had on one or two occasions, when he found it desirable to add more silver to the portion already made, used a very concentrated solution of nitrate of silver, which enabled him to add sufficient without much altering its physical condition.

Mr. Mayall asked Mr. Simpson whether he had tried the experiment of giving his process a dose of castor oil. He also wished to know whether he had tried sulphide of potassium before fixing. He was happy to bear his testimony to the value of the new process which had been presented to the Society; and he felt it due to Mr. Simpson to say, that by whatever process the print he held in his hand had been produced, it possessed a degree of excellence in the shape of positive printing which he had never seen before, more resembling a fine engraving by Cousens than an ordinary photograph. Of course, with reference to a subject so new, and coming upon them as this did for the first time, they were not able to discriminate its peculiarities so materially as they would be in a position to do after a few days, when it had been more carefully considered. And he had no hesitation in saying, from the specimens now exhibited, that the Society had to congratulate Mr. Simpson, who had shed an honor upon the meeting by bringing forward in so disinterested a manner a process so new and interesting, involving, as it did, so many fresh chemical inquiries, which were as yet but imperfectly understood.

Mr. Sebastian Davis said he believed the process would commend itself to experimentalists, inasmuch as they themselves could prepare their own paper throughout, and would be thoroughly conversant with all the materials used during the preparation of their positive prints. This was a point of great interest to every one, because in this way they could trace out the particular difficulty which might interfere with obtaining uniformity of tone, density, and permanency. In his own experiments he had departed a little from the formula of Mr. Simpson, and had, consequently, obtained a varied result.

Mr. Williams said the real use of castor oil was to make the collodion tenacious, and prevent it shriveling. He wished to know whether the white, milky collodion, a specimen of which was exhibited by Mr. Simpson, would blacken when exposed to the light, or would remain permanent as it now appeared.

Mr. Simpson said he had not exposed it to light, conceiving that the effect would be that it would blacken.

Mr. Cooper said he knew that it did blacken, from the fact of some in his possession having become exposed.

Mr. Simpson, in reply to an inquiry, said he thought the sooner the paper was used, after being prepared, the better; but he had used some after the lapse of a week, which had not lost its sensitiveness. In reply to a further inquiry, he said it was difficult to state, in figures, how sensitive it was; but his impression was, that it printed in one-half the time that albumenized paper required for the purpose.

Mr. Cooper asked whether the prints did not lose more in tone and tint than those of albumenized paper

Mr. Simpson said he found they required almost entirely the same treatment in toning and fixing.

Mr. Cooper said, in his own experiments he found that the more he increased the quantity of chloride in the collodion, the more they lost in tone.

Mr. P. Robinson said that in the observations on the process he had made, he thought the prints lost less than albumenized paper.

Mr. Mayall said that losses would be stopped entirely by the sulphide of potassium. He had found that, if not washed in that salt before they began, they did lose considerably. A very feeble solution of not more than one-tenth of a grain to an ounce of water would enable them to get rid of the difficulty to which Mr. Cooper referred.

Mr. Frank Eliot suggested that nitrate of silver in the collodion would aid materially in giving vigor if required.

Mr. Simpson said, with regard to the use of castor oil, he had made one or two experiments; but he could not say that he had carried them out to any extent. The only difference he found was, that the physical character of the collodion was altered; it was made more tenacious and more adherent. It was quite possible, he considered (but he had not tested it sufficiently to speak definitely on the subject), that it might supply something that formed an organic compound with the silver. Reference had been made to the use of citrate of silver; he had not tried it himself, but he had been in correspondence with some persons who had done so with decided advantage. His special aim hitherto had been to get the best results by the simplest means; and he had

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striven, therefore, at the obtaining of vigorous prints with the simple collodion, chloride of silver, and nitrate of silver. If these failed, he should necessarily apply himself to the use of organic compounds; and it was quite possible that those might be worth the experiment. He had not on this occasion brought any specimens which he had obtained by other means, simply because he wished to speak of the process in its broadest and simplest outlines. He had not met with any example like that referred to by Mr. Davis, of the image sinking into the paper. In almost every case the image had been in the film of the collodion; when that film was removed by cracking or otherwise, he had sometimes found faint traces in the paper of the deepest black of the image, but in other instances no trace whatever. One remarkable fact, well worth pondering over, was that he had obtained a good vigorous picture with collodion in which there was only half a grain of soluble chloride and two grains of nitrate of silver in an ounce of collodion; a sheet of paper 22 by 18 might be coated with this quantity, whereas in the ordinary albumenized paper about 50 grains of nitrate was absorbed by each sheet. This was a pregnant suggestion in regard to ordinary printing, as indicating the large amount of silver which ought to be saved.

Mining by Machinery.

Although upwards of half a century has elapsed since the first substitution of machinery for manual labor in the working of rocks, we have still to look forward to the invention of really efficient machinery for the purpose. At the recent meeting of the "Institution of Engineers in Scotland," a highly interesting paper on "Tunneling and Coal-Cutting Machinery" was read by Mr. John Downie, who remarked that the application of machinery in one form or another has now become universal in almost every branch of industry, but only within the last few years has there been any decisively marked advances made in the application of mechanical power as a substitute for manual labor in the extraction of the mineral wealth which may be truly said to be the very basis of our nation's greatness.

The first of the Tunneling Machines noticed was the celebrated one at present engaged in boring the Mont Cenis Tunnel, invented by M. Sommelier.

Schwartzkopf and Philippsohn's Machines are, he believed, in use in the Swedish mines, and consist of a column carrying a jib, which is raised or lowered by a pinion working in a rack. The boring cylinder, with piston, is the same as in an ordinary steam-engine; the valve is conical and circular, and is turned by a spiral groove in cross-head of piston-rod. This cylinder is traversed along a single frame by means of a screw by an attendant (according as the boring proceeds), exactly in the same manner and design as an ordinary slide-rest of a lathe. The rest or frame, with cylinder, is carried by the jib; the boring tool is loosely held in the end of cylinder frame, and is turned by a rachet, the pawl of which receives the same motion as the circular valve, being worked off the valve spindle; the boring tool, unlike the Mont Cenis one, receives its blows from the end of piston-rod; and, to allow the debris to get clear out of the hole (in consequence of the tool not reciprocating), the tool has to be made of a spiral form, like a wood auger, to allow the debris to wind out; when set to work, the column is jammed fast by clamps betwixt the top and bottom of adit in the desired position. The piston makes from 1,200 to 1,400 strokes per minute, and bores Norwegian granite at the rate of $1\frac{1}{4}$ inches to $1\frac{1}{2}$ inches per minute.

Captain Penrice's tunneling machine is a powerful and colossal machine, and consists of a large face-plate (the diameter of the tunnel to be bored), with several rows of some hundred of steel chisels across its diameter. The face-plate is mounted on a massive axle, working in bearing, at the end of which is the piston, working in a central cylinder, and has a large and small area, the same as in the Mont Cenis cylinder. The face-plate, with its numerous chisels, receives its reciprocation from the above central cylinder. After each blow it is turned slightly round, at the rate of two and a half revolutions per minute. The entire face or heading of tunnel surface is thus struck or tritured into small fragments or particles, which upon falling down, are caught by an endless creeper, worked from a third donkey engine, which conveys the debris underneath its entire length, and delivers it at back of machine. It may be here mentioned that this machine would only do for soft stone; and the immense number of chisels take considerable time to take out and replace when they require sharpening.

The machine proposed by Gay, of Paris, consists of a cylinder the diameter of the tunnel, or say 6 feet 8 inches diameter by 2 feet 4 inches deep, and say $1\frac{1}{2}$ inch thick; and round the front edge are fixed steel chisels at intervals for soft stone, prisms of flint agate, &c., for ordinary rock, and prisms of diamond for very hard rock. It is carried on an axle working in suitable bearings: and this axle carries a central boring tool. The cylinder and central tool receive a rotary motion from a belt or wire-rope, worked from a steam or air-engine, working in a pulley on a cross shaft, which gears into the axle by a pair of bevil-wheels—thus making a circular trench and a central hole. A rope is attached to the end of axle, and passed over a pulley, at the end of which is a heavy weight, for the purpose of keeping the cylinder and central tool steadily pressed against the rock whilst boring. Upon the necessary depth being attained, the machine is withdrawn, and another is placed to widen the bottom of the central hole, in order to make a powder-chamber; which, upon being blasted, will displace the whole mass out to the depth of the circular trench. He understands this machine works very well and rapidly, but is not aware where it is working. He has heard that a machine of a similar kind was, in the year 1852, made in Boston or New York, America, and worked, it is said, at the Hoosic Tunnel. It was designed for cutting a circle 24 feet diameter, but has no note of its performance.

Vallauri and Buquet's machine (made by Cail & Co., of Paris, the celebrated engineers) is composed of two carriages—the lower one being mounted on six wheels, and the other is placed on the top of lower carriage, along which it slides in two V grooves, after the manner of the table of a planing-machine. At the end of the top carriage is a cross axle, carrying four quarters of a circle—one on each side, and the other two intermediate. The diameter of the quarter circles when revolving is nearly the height of the tunnel: on the periphery of each quarter circle are steel points, placed at intervals, and so set spirally that each cuts its own portion of a groov in the rock. These quarter circles are caused to revolve vertically by a wire-rope, worked from a portable engine outside the tunnel, after this manner.

He believes this machine has been at work in the Pyrenees and Carrara; and one claim the inventors put forward is, that this method does not require the employment of powder; another is, that the high speed of driving rope keeps up an excellent ventilation, and by working two machines alternately the system allows of the removal of the debris without interrupting the progress of the work.

De La Haye's machine consists of two frames, adjustable as to hight or length, which are secured between the top and bottom of shaft or adit. These frames carry a horizontal carriage for tool, which is caused to reciprocate and cut a trench after the manner of a plane: the raising or lowering of such, according as it executes the work, is done by an attendant. This machine is also adapted for cutting in a vertical direction; but he is not aware as to what power is employed to work such carriage.

The principal features of Freeby's machine are, a number of spindles carrying the tools (say eight or more) are carried in a cast-iron frame, which slides along a lower frame mounted on wheels, and so arranged that it can be set at an angle, slightly vertical, or horizontal, across each and midway of the spindles, one of which is driven by a belt which drives all the others by intermediate cog gearing. On each of the cross shafts is a revolving cam, which strikes a 7-toothed circular cam, on each of the longitudinal or tool spindles, which partly turns and presses them against a spiral spring, and so soon as the revolving cam slips clear, the springs cause the tools to strike.

Munro and Scott's machine consists of circular cutters, which reciprocate a part of a circle, and are worked from a circular steam chamber, in which a piston also works partly in a circle. The steam chamber with circular cutters is traversed up and down in a frame, and from side to side, cutting a trench around the tunnel.

Westmacott's machine, introduce by Mr. Sopwith at Mr. Beaumont's mines in Allenheads, is worked by water pressure, and strikes the tool same as Schwartzkopf and Philippson's, but with what results he is unable to say, and also to describe the machine. He read recently, in a short account of it, that it worked satisfactorily, but some trouble was experienced in keeping the holes clear of debris.—*Mining Journal.*

Manufacturing Items.

The water power of the country is being very largely increased by the construction of reservoirs for the supply of water in dry times.

The Hamilton Woolen Manufacturing Company, o Globe Village, have purchased a tract of land in the towns of Holland, Mass., and Union, Conn., which they are about to flow into an extensive pond, covering several thousand acres, sinking some of the best farms in the upper valley of the Quinebaug river.

The first tar manufactured in Maine was sold in Portland, and brought from $5 75 to $7 per barrel.

Owing to the fluctuations in the price of cotton, and uncertainty of sales, the mills at Lewiston, having run at a loss, are about shutting off work for a season. Some have already stopped. Cotton is now twenty-five cents per pound lower than when that now being worked was bought, and of course no mill can go on without sad losses, except upon contracts entered upon some time ago. Let prices of cotton goods touch bottom, and then manufacturing interests will prosper.

The various grades of metal are attracted to Pittsburgh by the demands of thirty mills for rolling iron, which produce one-third of all the iron rolled in the United States, and have a capability of producing fully one-half. Eight of these mills are fitted for the production of navy armor plates, and have supplied many thousands of tuns for our present iron-clads.

The mills of Rockville are as yet running on full time. The machinery is being rapidly put into the Carlisle Thread Co.'s new mill; also in the new Florence mill. The work on the Leeds mill is about at a stand still.

Tarred Corn for Crows.

It is generally understood that tarring corn prevents crows from destroying it. The *Country Gentleman* says: "The old remedy of applying tar was always effectual. It was applied by pouring hot water on a half bushel of corn in a basket or tub, allowing it to remain only a few seconds to heat the outside of the grain, but not to kill the germ, and then pour on, say a pint of tar, and stir it quickly and rapidly. Every grain will become nicely varnished with it. In the scarcity of common tar, we have been told that gas tar has been tried, and found to injure or destroy the grain."

[An old farmer recently told us that so far as *eating* the corn was concerned, tar is an effectual preventive; but the crows pull up and pull down to see if they cannot find some that is not tarred, and the only remedy he knew of was to feed them by throwing corn on the ground, so as to save them the trouble and anxiety about their dinners.—Eds.

Fictile Ivory.

Fictile ivory is plaster of Paris which has been made to absorb, after drying, melted spermaceti, by capillary action, or it may be prepared according to Mr. Franchi's process as follows:—Plaster and coloring matter are employed in the proportions of a pound of superfine plaster of Paris to half an ounce of Italian yellow ocher. They are intimately mixed by passing them through a fine sieve, and a plaster cast is made in the usual way. It is first allowed to dry in the open air, and is then carefully heated in an oven; the plaster cast, when thoroughly dry, is soaked for a quarter of an hour in a bath containing equal parts of white wax, spermaceti, and stearine, heated just a little beyond the melting point. The cast on removal is set on edge, that the superfluous composition may drain off, and before it cools, the surface is brushed with a brush like that known by house painters as a sash tool, to remove any wax which may have settled in the crevices; and finally when the plaster is quite cold, its surface is polished by rubbing it with a tuft of cotton wool.

One million two hundred thousand two cent pieces were coined last month.

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Improved Steam Boiler.

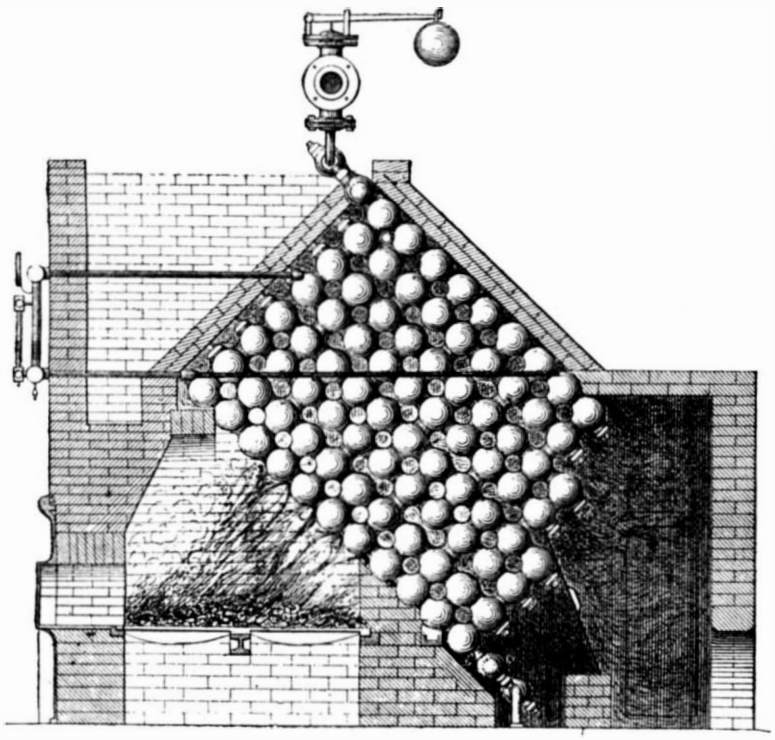
On page 90, Vol. XI., of SCIENTIFIC AMERICAN, we gave an editorial account of Harrison's steam boiler which was at that time attracting much attention from engineers abroad our foreign contemporaries especially speaking favorably of it. We here publish engravings of this steam boiler with a description of its construction.

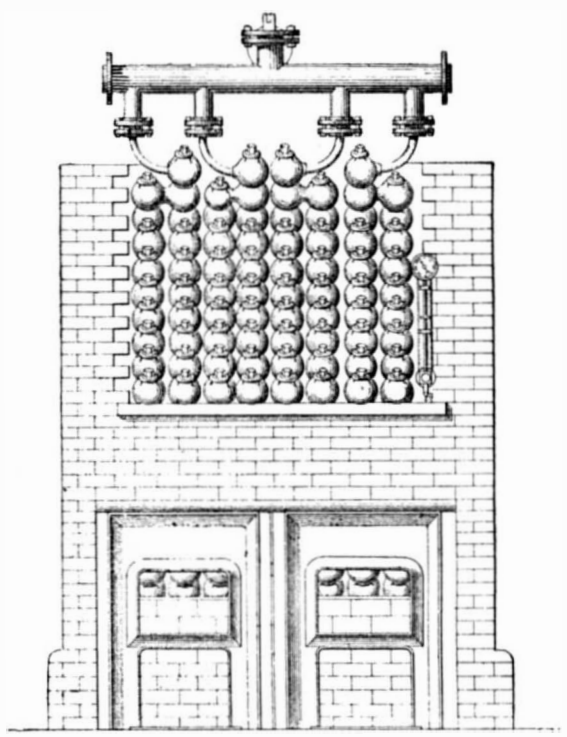
The boiler, in plan, is simply a series of cast-iron bomb-shells, such at least in form, about eight inches in diameter by three-eighths of an inch thick. These shells are all strung on a bolt like beads, and the necks, where the bolts pass through, are three inches in diameter. Four shells are cast in one piece, connected by the necks of course. Each section, therefore, has eight openings, the edges of the outside shell being faced so as to have a true bearing on the others, and otherwise fitted so as to be steam tight. All the castings, of any number required, are then bolted together by $1\frac{1}{4}$ inch bolts. Each section of four shells may be considered a separate boiler. The heat surrounds the lower spheres, and completely envelopes them, so that they are all fire surface. In the upper shells there are fire-brick screens so placed as to moderate the heat on those parts. The shells weigh $22\frac{1}{2}$ pounds each, or about one hundred of them to the tun, and the boilers are rated by weight, as "4-tun boiler," etc. Each shell holds seven pints of water, and in round numbers presents one square foot of heating surface, and holds one galion of water.

A series of experiments made to test the strength of an individual shell showed them to be capable of resisting a pressure of five hundred pounds per square inch.

Another very great virtue in this boiler is its freedom from scales. It is stated that after a long period it was found absolutely free from incrustation. If all the results claimed are obtained, this boiler seems to be a most valuable addition to engineering science. Immunity from disastrous explosion is promised, for as but one of the spheres or shells is likely to explode at once, the injury is likely to be confined to that one, and the immense strength of the shell is almost an insurance against a disaster of the kind mentioned.

Our readers are referred to an advertisement of this boiler on the usual page. For further information address the Harrison Boiler Works, N. E. corner of Market and Juniper Streets, Philadelphia, Pa.





HARRISON'S STEAM BOILER.

Extracting Silver from Lead.

Don F. M. Millan del Real, of Bordeaux, has brought forward an invention the object of which is the improvements in extracting silver from lead. For this purpose lead from which the silver is desired to be extracted is run from the reverberatory furnace into a heating pan, under which a strong fire has been previou slymade, that no cooling of the lead may take place, but that its temperature may be raised in a short time. The surface of the lead is then skimmed, after which he introduces about one part by weight of carbonate of ammonia to every 100,000 part by weight of lead contained in the heating pan; the carbonate of ammonia is introduced by means of a covered ladle perforated with small holes. This instrument, with the carbonate of ammonia therein, is stirred about in the lead for about five minutes, and reinserted, charged with one part of sea salt to 10,000 parts of lead. This is stirred in for ten minutes, the quantity of sea salt being increased, when the quantity of silver contained is high. The skimmings are placed in heaps, and afterward heated in a close retort. One per cent of zinc is then added, in the same way as the carbonate of ammonia and sea salt, the mass being stirred for five minutes with each charge of zinc until sufficient zinc is introduced. The fire is then withdrawn, that the mass may cool as quickly as possible. As soon as the surface is slightly crystalized, it is skimmed and retorted with the the other skimmings, the silver being separated by distillation.

PROFESSOR SILLIMAN ON PETROLEUM IN CALIFORNIA.

The New Haven *Daily Morning Journal and Courier* publishes the following letter from Professor Silliman in relation to the discovery of petroleum in California. Though the explanation of the relation of petroleum to asphaltum is the same as that which we have already given, we are induced by the general interest in the subject to publish the material portions of the letter. It will be seen that the present position of the California oil region is the same as that of other undeveloped oil regions; there is an abundance of surface indications, but no positive evidence yet of the existence of large cavities filled with oil in sufficient quantities to pay for boring:—

"Under the general name, Petroleum, are confounded numerous mineral oils of different characters. All of these are compounds of carbon and hydrogen, and all are representatives of a common type, being, so to speak, multiples of common coal gas, marsh gas, or carbureted hydrogen gas, all of them the products of the transformation of woody fiber, (or of other organic matters.) Every one knows that this gas is a constant product of oil wells, often being blown out with great violence, and in enormous quantities. It is also seen escaping through "tar springs," and oil springs both in California and all other parts of the world, where these natural phenomena have been observed. If you will take the pains to read the article 'Petroleum,' in Appleton's Cyclopedia, which is the best digest of the facts easily accessible, you will find ample confirmation of these statements.

"Asphaltum differs in chemical composition from petroleum only by containing a small proportion of oxygen. This differing may be either original, the oxygen remaining from the original constitution of the organic matter transformed, or it may be as already stated the result of atmospheric action. At all events, in almost all cases, these substances are associated in nature, (as you will notice in the article just referred to.) The Bakoo oil on the south shores of the Caspian occurs in a porous sandstone of Tertiary age, over an area of twenty-five miles by half a mile in width.

"The same is true of most other localities of petroleum in various parts of the world. In the memoir by Pelouze and Cahours, on the American Petroleum published in 1864, the statement is made, 'This mineral oil, petroleum, exists, likewise, in abundance, in Texas and on the Pacific coast in California where it is found associated with bitumen.'

"You are right in supposing that my Report to the California Petroleum Company has been understood regarding the asphaltum as a chief source of oil. That a considerable quantity of oil can be obtained from the pools of thin tar or bituminous oil, from the thin oil which runs down the Mupu Arraya is quite evident. But it was never supposed by me that any proper developments of the estate could be made without artesian borings. That these will be fruitful along a long line in the basin parallel with the axis of the mountain, which extends for thirteen miles, appears to me extremely propable. An effort by a Mr. Gilbert to bore a well on the west end of the estate failed for want of skill and proper tools. I have a section of that well obtained from Mr. Gilbert's information, which shows that in 62 feet he passed alternately pervious and impervious strata with zones of oil, and seams of gas blowing violently and beds without oil or tar. That all wells sunk here will be fruitful no one can suppose. But that so much oil can struggle up with bitumen through the beds without being also found at no great depth by boring, seems highly improbable. In answer to your inquiry I would say, localities 'oozing at the present time' a substance 'fluid and thin,' are in many cases properly styled springs of petroleum. Such are the springs on the Mupu, as also on the south side of the Azufri Mountain, and at many other points in Santa Barbara County. The oil distilled from the thin tar is chiefly heavy oil. It appears so far as our knowledge enables us to judge that the California oil is heavier than the Pennsylvania oil of equal quality. Burning oil of 38°, from the California petroleum, burns in a lamp with very superior illuminating power and without smoking. This is heavier than the commercial standard for eastern oil."

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Improved Artificial Leg.

Artificial legs have been very greatly improved of late years, and many important additions, heretofore deemed unattainable, have added much to their appearance and utility. Externally they are undistinguishable from Nature's handiwork.

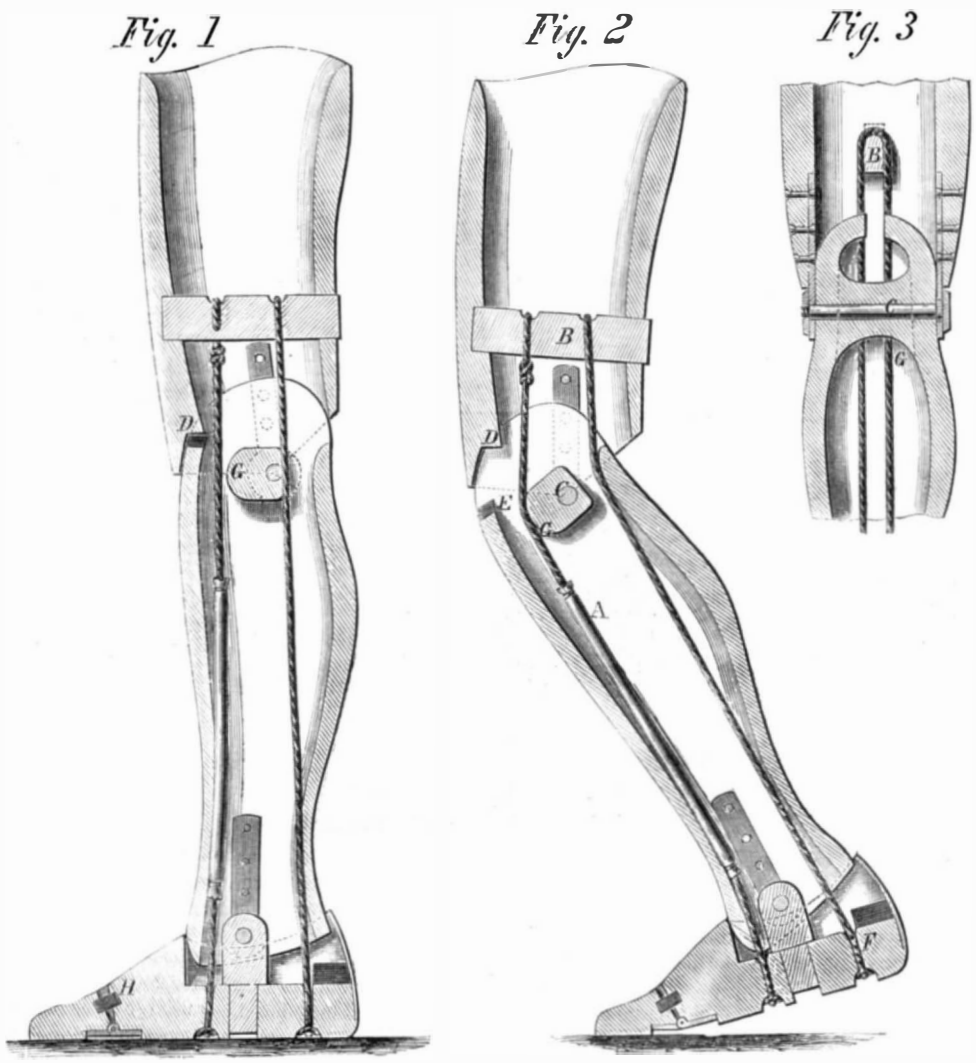
The leg here illustrated has a peculiar detail which consists in the employment of an elastic cord, ful filling the functions, in a measure, of the sinews, tendons and muscles of nature. In the engraving, A represents this cord, one end of it being attached to a supplementary cord which is not elastic; this latter is connected to a bridge, B, placed in the upper part of the leg.

The fulcrum of the leg, representing the knee joint is at C, and the shoulder, D, which prevents the leg from being thrown too far forward, is cushioned with rubber, E, so that no sound is caused by contact of the two parts; another cushion is also fitted to the heel piece, F, for the same object.

When the non-elastic cord yields or becomes slack, as when the leg is bent, Fig. 2, the elastic cord which is strained over the stop, G, raises the front part of the foot with every step, so that the toes are prevented from dragging on the ground, also preventing a halting or limping gait. The toe joint is aided in its action by a rubber cushion, H, in addition to the hinged plate beneath it, so that the natural action of the foot is preserved.

Another improvement in the leg is in the construction of the foot piece, which, as may be seen, is entire so far as the outline is considered. By inserting the ankle joint in the solid foot, a shoe may be worn without inconvenience or the annoyance which is experienced where working parts come in contact with the hinder portion; it also adds to the neat appearance and fit of a stocking, and is unlikely to cause wrinkles or create a suspicion of anything unnatural.

This leg was patented by F. W. Newbert, of Pittsburgh, Pa., on the 22d of November, 1864. For further information address him at Box 471, as above.



NEWBERT'S ARTIFICIAL LEG.

Sweeping Carpets.

Sweeping carpets too often wears them out rapidly. It is obvious to any one that a brisk, daily brushing over the whole surface must wear away and carry off more woolly particles than the occasional stepping of feet during the day without the rubbing and scraping given by the broom. To allow sand and grit to accumulate on the surface, and to become ground into the fibers by the pressure of sole-leather is, however, worse than sweeping. They should therefore be always kept clean. Men who object to large carpet bills should provide themselves with slippers, and not come in with muddy boots. It is a matter of economy with them to pay $2 or $3 in the purchase of slippers, rather than a hundred or two for ingrain and Brussels. This perhaps would be a stronger consideration with some and exert a more controlling influence than frequent sharp reproofs from the mistress of the interior.

There are different ways of sweeping carpets. The most objectionable is performed as follows:—The operator first places the broom perpendicularly upon the floor; then with a quick, thrusting motion the lower part is pushed forward and thrown upwards, carrying the dust with it in large clouds, until the air of the room is filled with it. The brush of the broom, by a frequent use, thus becomes bent, somewhat in the form of a hook. The dust which fills the air gradually settles upon chairs, tables, bureaus, writing-desks, cases of books, picture-frames, clocks, maps, looking-glasses, &c. The process thus consists virtually in merely elevating a stratum of dust on the carpet and placing it on all these different articles of furniture. After some minutes the duster passes around and the stratum is removed to its original position on the floor, thus making a sort of perpetual motion resembling the great circulation of moisture from the earth to clouds and from clouds to rain back to earth again.

A much better way for performing the work, is to place the broom upon the carpet in an inclined position, with the handle inclining forwards; drawing it quickly over the surface in this position, and scarcely raising it from the floor, will prevent the raising of very little dust. In order to do the work effectually, however, the motion should not be given by long strokes, but by a quick succession of short ones. It would be worth fifty dollars to any housekeeper who does not understand the business, to see these two modes distinctly performed. By the former or thrusting mode, the coarser dirt, or that which does not rise in the air, is shot ahead several feet, and spread over a large surface; by the latter or drawing mode, it is kept more compactly together, something like the winrow of hay in the meadow. The broom, instead of being bent around like a hook, as above stated, is kept straight and smooth, and lasts several times longer.—*Counry Gentleman.*

The Siberian Plague.

All Europe has been alarmed by the reported appearance of the Siberian plague at St. Petersburg and its advance toward the frontier of Germany. A telegram from St. Petersburg states that it is committing fearful ravages, and that official returns as to the number of victims have altogether ceased. A semi-official organ of the Russian Government denies the correctness of these reports, which, however, the neighboring countries agree in accepting as true. The Austrian Government has sent a Medical Commission to St. Petersburg to examine into the nature of the epidemic, and the French Government has ordered all ships arriving from Russia to be put in quarantine. The English Government has sent instructions to the consuls in Russia and the ports of the Baltic to collect all the information they could on the subject and forward it to England.

Weights on Railways.

Let an unaccustomed person ride on an engine going full speed, and he will characterize the jolting as something very frightful. This jolting is no proof that the road is unevenly laid, but it is partly due to the fact that the wheels, instead of revolving, constantly sledge along the rails. The result is, that the rails are worn away at a rapid rate. The following experiment will prove it. Clean a given portion of rail so thoroughly that it will not soil a white handkerchief. Wait till a train has passed, and then apply the handkerchief. It will be covered with fine iron dust. This dust represents so much permanent way destroyed. Directors are now adopting steel rails, costing from £14 to £15 per tun, which, of course, afford more resistance to the enormous burden they have to bear. Some engineers think this is applying the remedy at the wrong end, and, instead of making the rails tougher, the engines and carriages should be made lighter. It is certainly worth considering whether railway engines and carriages need necessarily be such ponderous affairs—at any rate for passenger traffic. The Americans accuse us, with some justice, of being wedded to weight and massiveness in all our manufactures, comparing, for instance, our crawling broad-wheeled wains and elephantine horses, with their express wagons and small-boned cattle. There is a curious comparison between a first-class railway carriage and an omnibus—carriage weighs 5 tuns, carries 18 people weighing 22 cwt.; omnibus weighs 1 tun, carries 30 people weighing 37 cwt. Consequently the railway carriage weighs five times as much as all the passengers put together, the omnibus only half as much. If omnibuses were proportionately as heavy as railway carriages, they would only carry three people; if, on the other hand, railway cars were as light as omnibuses, each carriage would carry 180 people!—*London Mining Journal.*

[If the road was as smooth as the slide of a steam engine how much jolting would there be?—Eds.

Embalming.—M. Falconi, in a paper read to the French Academy, states that after a series of experiments made with different salts, he finds that sulphate of zinc, prepared of different degrees of strength, is the best material. An injection of about a gallon would perfectly well preserve a dead body, as is proved by the preparations belonging to the anatomical cabinet at Genoa. Bodies so prepared preserve all their flexibility for 40 days. It is only after that period that they begin to dry up, still preserving, however, their natural color. Chloride of zinc and sulphate of soda are sometimes used also.

The Albany iron-works in Troy, have commenced the manufacture of mild steel under Bessemer's patent, of which they have the entire control in this country.

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RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week; the claims may be found in the official list:—

Steam Trap.—The object of this invention has been to make a steam-trap for the discharge of the water of condensation from steam pipes and vessels, automatic under all circumstances and of the utmost simplicity in its construction. The water is received in a metalic casing through the bottom of which is passed a pipe closed at its top and perforated with a series of holes at a small distance above the bottom of the casing. An open vessel, in shape like an ordinary pail, but having a collar fitted around and extending a short distance above an opening through the center of its bottom, fits over the pipe, and its collar acts as a moveable seat, to the perforations in the pipe. This collar or valve seat covers the valves when the float is at rest, and uncovers them when it is in motion, so as to discharge the water. Peter Hogg of New York City, is the inventor.

Churns—This invention consists in forming the sides or bottom or both of a churn, with a series of sharp pointed projections, in connection with the use of a revolving dasher provided with a series of sharp-pointed beaters, which dasher is so arranged with regard to the pointed sides and bottom of the churn, that as it is revolved therein, it throws or dashes the cream against the pointed sides with sufficient force to cause its butter-globules to be thoroughly and expeditiously broken and cut up, thus enabling butter to be churned with great quickness and rapidity. The advantages of this process are evident. A. O. Gallup and E. A. Hewitt are the inventors, and can be addressed at New London, Conn.

Inclined Bearing.—This invention consists in setting the lower part of vertical or inclined bearings in a cup or socket, which will receive and retain the lubricating material which escapes from the bearing; and also in providing a chamber opening inward in said cup, and near its highest part, which will retain any lubricating material received therein, and prevent it from being wasted by centrifugal force during the rotation of the spindle; and also in providing a similar chamber in the interior of the highest part of the bearing; and lastly in forming a spiral groove around the interior of the bearing from its bottom to the said chamber. George W. Briggs, Fiskville, R. I., is the inventor.

Improved Chandelier.—This invention consists in the combination of a sliding joint with the central rod or tube of a chandelier, so that the chandelier can be used in the ordinary manner and a drop light be obtained in connection with or independent of said chandelier. The gas is conducted to the various arms of the chandelier by a combination of two chambers connected with each other by a series of pipes arranged around the central tubes of the chandelier, the upper end of which is furnished with a central tubular stem which passes downward and forms the guide for the central sliding tube; and in combination with this tube and a small pipe rising from the gas chamber of the drop light it forms a liquid joint to prevent the waste of gas whatsoever the position of the drop light. Peter Loth, 374 and 376 Canal Street, New York, is the inventor.

Pump.—This invention relates to a new and improved pump of that class which are provided with two buckets or pistons working in one and the same cylinder pump. It also consists in placing a stuffing box in the upper bucket or piston in order to prevent leakage of air or water between the two piston rods —one being solid and the other tubular and the former working through the latter.—A. Sutton, Detroit, Michigan, is the inventor.

Grain and Grass Harvester.—This invention relates to a new and improved Grain and Grass Harvester designed for manual operation, and consists in the employment or use of an endless sickle arranged to work over polygonal pulleys and with a continuous movement in one direction whereby the jars and concussions attending the ordinary evaporating sickle are avoided. The invention also consists in a novel arrangement of the platform and framing of the machine whereby the grass or grain may be cut at different hights from the surface of the ground as may be desired. The invention further consists in a novel construction of the reel whereby the same may be adjusted to suit the hight of the sickle. Benjamin Wieland, Orangeville, Stephenson County, Illinois, is the inventor.

Machine for Tying Knots in Grain-binding Devices.—This invention relates to a new and improved device, for tying knots in sheaf cords, and is designed to be use in connection with a grain-binding apparatus. The invention consists in the employment or the use of a slatted shield in connection with a revolving tube, a sliding tube and a sliding rod provided with a hook; all arranged to operate in such a manner as to effect the desired end. The patent bears date March 21. Ante-dated March 6, 1865. W. P. Barker, Grand Rapids, Michigan, is the inventor.

NEW SYSTEM OF REGULATING RAILWAY TRAINS.

Upon the London and Southwestern Railway, in England, a new system of running the trains has been adopted in place of the time system generally in use. The plan is designed to make sure that there shall be but one train at a time upon the portion of the line between any two stations. When a train passes a station, A, a signal is raised to warn the engineer of the following train not to pass A, until the first train has passed the next station, B. When the first train passes the station, B, intelligence is telegraphed to A, when a signal is raised to indicate that the track is all clear to station, B. The new method is called "The block system of signals." Its advantages and the details of the arrangement are thus set forth by the *Mechanics' Magazine:*—

"In the words of Colonel Yolland, in his evidence at Egham, 'The danger of running trains at intervals can only be obviated by the block system of telegraph.' The same gentleman, in his report on the collision between two excursion trains on the Midland Railway at Market Harbro', in August, 1862, expressed the following decided opinion:—'An interval of time as a means of avoiding collisions between trains is, in my judgment, worse than useless; it is deceptive and thoroughly uncertain, as an interval of half an hour at one station may have entirely disappeared before the first train arrives at its next appointed stopping place; whereas an interval of space, no matter how short, between following trains, if preserved, will always prevent a collision from taking place. I am not arguing in favor of some impracticable mode of working traffic, and laying myself open to the remarks—that it is all very well in theory, but will not answer in practice; but I advocate, as the best means of preventing these fearful collisions, the adoption of the electric telegraph and the working of the traffic on the "block" system, of not allowing two following trains to be between two adjacent stations at the same time, a system now carried out on one of the principal lines of railway in this country.'

"The system simply consists of three wires, one for the up line, a second for the down line, and a third for the bell. Each station is provided with a switch, a semaphore, and a bell. On a train entering a station—say Barnes—the signal man there would communicate the fact to Putney by the bell. By a code of signals, the description of train is, also, at the same time made known. On receipt of the signal the man at Putney, by using his switch, raises the arm of the semaphore at Barnes against any following train, and this is not released until the train has cleared the Putney station, and the process is so repeated from station to station along the line. Every precaution has been taken to elliminate all imperfections in existing instruments, and to make the plan fully meet every requirement demanded of such an important adjunct to the working of the line. These requirements are:—Firstly, a means of communication between two stations which shall give notice of the approach and departure of trains and shall indicate its nature. The general method of distinguishing trains, in addition to the particular discs and lights, is by sounding the whistle a certain number of times when approaching a junction or station. The same system is adopted with electric signals, a bell of simple construction being sounded in place of a whistle. Secondly, a 'danger,' and 'all clear' signal to rule and protect each line of rails. The signal used to denote 'danger' and 'all clear' to the signal man is the same as that exhibited to the driver. Of course, the actual instruments themselves are not the same. The signal man's signal is in his box, the driver's on the line, but the nature and design of the signal are similar. Thus, if the raising and lowering of a semaphore arm be used on the line to guide the driver, a miniature semaphore arm is used in the box to instruct the signal man. Thirdly, that the man at one station shall have the sole and complete control over the signal at the other station, and that it shall be impossible for him to interfere with or alter the signal in his own box. The apparatus used on the South Western Railway most completely fulfills this condition. By it the man at one station has the sole and complete control over the signal at the other station, and it is impossible for him to interfere with or alter the signal in his own box. He cannot do this by any movement of his own apparatus or any accidental disturbance of his instruments. The 'all clear' signal can only be given by the man at the other station. The principle by which the various signaling instruments are actuated is simply that of the attraction of the electro-magnet being made to do what the strain of the wire effects upon the line. Gravity maintains the signal at 'danger'—the the electric current takes it off.

"The fourth is a most important point, and one upon which the whole safety of electric signaling depends. It is that every signal shall be properly acknowledged, and that the acknowledgment shall not only imply the due receipt of the signal sent, but that it has been correctly understood and properly acted upon. In pursuance of this, the instructions are that every signal received must be acknowledged, and that no signal is to be considered complete until it has been acknowledged.

"Electric signaling is perfectly distinct and dissimilar from telegraph signaling, with which it in no way interferes. The general auxiliary character of the telegraph is still preserved, and it continues to be useful in giving notice of the delay of trains, and, in various ways preventing the want of punctuality in one train affecting others. The electric signals govern the operations of the telegraph, and render them more secure, so that no harm can result from an error or misconception in the wording of a telegram. When viewed in its true light, railway authorities cannot fail to perceive what a power the electric system affords them to expedite traffic, guarantee safety, and so inspire the public mind with a confidence, which cannot be established whilst there exists the fear of such calamities as that which has just occurred."

An Old "Fogy."

The *Mechanics' Magazine* has the following:—

"Commander B. Sharpe, R. N., read a paper at the Royal United Service Institution, last Friday, on the comparative merits of smooth-bore and rifle ordnance when employed at sea, and on the proper armament for ships of war. After considering the first part of the subject at some length, Commander Sharpe arrived at the conclusion that rifle ordnance had no merits whatever, as compared with smooth-bore ordnance, for sea service. With regard to the second part, the author ignored the utiliry of the turret, or any similar system of naval armament and heavy guns, his objections being as they were inapplicable, and recommended the use of smooth-bore guns of small caliber. Being an afternoon paper no discussion took place thereon; had it been otherwise the gallant Commander would doubtless have quitted the Institution better informed, if not better convinced, than when he entered, of the utility of turret ships and heavy rifled ordnanced.

[Commander "B Sharpe," who, to repeat Hood's joke, is evidently "A flat," do'nt like rifled guns, and ignores turrets. What a pity!

TESTING ENGLISH CANNON.—The testing of the competitive 12-pounder Armstrong and Whitworth guns was brought to a close on Tuesday last. The charges used consisted of 1½ lbs. to 3 lbs. of powder, and a number of shots varying from 3 lbs. to 6 lbs. The mode of testing was most severe, an air space being left between the shot and cartridge. The 12-pounder breech-loading Armstrong gun became unserviceable at the 42d round; the muzzle-loading shunt gun at the 60th round, and in both instances they simply cracked without a separation of the parts. The Whitworth 12-pounder violently burst into eleven pieces at the 90th round. The test applied to each gun was similar in all respects.—*London Mechanics' Magazine, March* 31.

Revenues and Expenditures of the United States for 1862, 1863 and 1864, and the estimated for 1865.

	1862.	1863.	1864.	1865.
Customs	$49,056,397	$69,059,642	$102,316,153	$70,271,092
Lands	152,234	167,617	588,333	642,186
Direct tax	1,795,332	1,485,103	475,649	16,080
Internal revenue		37,640,788	109,741,134	249,562,860
Miscellaneous	931,787	3,046,615	47,511,488	24,020,171
Total revenue	$51,935,720	$111,399,766	$260,632,717	$344,512,389
Expenditures	474,744,778	714,709,995	865,234,087	1,248,790,997
Excess of Ex.	$422,809,058	$603,310,229	$604,601,370	$904,278,608

DEBTS OF THE STATES.

Pennsylvania	$39,379,603	Maine	$5,137,500
Massachusetts	22,893 972	Connecticut	5,000,000
Ohio	13,500,751	Michigan	3 541,128
Illinois	11,178.514	Wisconsin	2,500,000
New York	6,278,954	Vermont	1,642,845

Magnesium Light.

The Magnesium Metal Company are now manufacturing magnesium upon a commercial scale, and we are informed that a supply of this metal has been ordered by the American Government for introduction into the American navy with the view, by the aid of the magnesium light, to check, if possible, blockade running. Several European Governments are also engaged in experiments with a view to its adaptation to lighthouses, and coast and sea signals, and it has been found successful at a distance of twenty-six miles.

INDIA-RUBBER VARNISH.—Four ounces india-rubber in fine shavings are dissolved in a covered jar by means of a sand bath, in two pounds of crude benzole, and then mixed with four pounds of hot linseed oil varnish, heated, and filter.

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English Breech-loading Rifles.

The London *Ironmonger* contains some interesting information about the trial to take place shortly to determine the best breech-loading weapon for military purposes. We copy:—

CONDITIONS.

I. Bore.—Minimum ·450. Each rifle must take the gage plug provided by the Council from muzzle to breech. Length of barrel—minimum, 2 feet 9 inches; maximum, 3 feet 3 inches; form of barrel, any; material of barrel, any; pull of trigger, minimum, 6 pounds; weight of rifle, 9½ pounds, full stocked, with metal ramrod and military sights; mechanically fitting ramrods not allowed.

The following general rules will guide the Council in deciding as to what constitutes military sights:—

FORESIGHT.

1. To be fixed to the barrel and incapable of adjustment.

2. The rifle to admit of a bayonet fitted for military purposes, being readily and firmly fixed without injury to the foresight.

3. If knife-edge, transverse section a triangle, of which the hight is not more than 1½ times the base, not undercut.

4. No bead sight unless covered by a strong shade, not less than four-tenths of an inch in diameter, inside measurement, firmly fixed to the barrel, and incapable of being removed.

BACKSIGHT.

1. To be attached to the barrel in front of the lock.

2. No transverse adjustment nor any other movable adjustment, except a hinged flap and a sliding bar, to be moved by hand only, without screws, racks, or any other mechanical appliances.

3. Graduations (on the Vernier principle or otherwise) may be marked on any part of the backsight.

4. The sliding bar to be with or without vertical lines or apertures, and the upper edge either straight or with a V of any angle or a rectangular notch, or a combination of these forms.

5. The outside measurement of the bed on which the flap of leaf rests must not exceed one inch.

6. No part of the backsight must exceed the width of one inch.

II. Ammunition.—Cartridges containing their own ignition.

III. Each competitor may enter more than one description of rifle on payment of £5 entrance fee for each rifle.

IV. The rifles shall be delivered at the office of the Association before 11 o'clock, A. M., on Monday, the 29th of May, and shall be tested and examined in the presence of the competitors or their representatives, between the hours of 12 and 5 P. M , on that day, by some person or persons appointed by the Council for that purpose; and the decision of such person or persons that any rifle is not in compliance with the above conditions shall absolutely disqualify such rifle for competition.

V. The rifles shall be fired from fixed mechanical rests. Government rests shall be assigned by lot to competitors who do not bring their own.

VI. Each competitor shall be responsible for the adjustment, fitting and general condition of the rest used by him during the trial. Each competitor shall be present to fire his rifle, or shall appoint a representative to do so.

VII. The order of shooting shall be determined by lot.

VIII. Each competitor, or his representative, shall fire 20 rounds for accuracy from each rifle entered by him from a fixed mechanical rest. Five sighting shots shall be allowed before commencing the 20 rounds for accuracy.

IX. At the conclusion of the 20 rounds for accuracy the target shall be examined and a diagram of the shooting shall be taken, by which the figure of merit shall be determined, as at the School of Musketry at Hythe. The diagram shall be signed by the competitor, or his representative, and by some person appointed by the Council.

X. After the rounds for accuracy 100 rounds shall be fired from the shoulder by the competiter, or his representative, into a pit as fast as the rifle can be loaded and fired, and to avoid delay this shall be done while the target is being examined.

XI. The tests for accuracy and rapidity shall be repeated until each competitor shall have fired with each of the rifles entered by him 60 rounds for accuracy and 300 rounds for rapidity.

XII. No cleaning out shall be allowed after the first shot has been fired.

XIII. At the conclusion of each or any of the 120 rounds the competitor shall, if required, hand over his rifle to the Council, or to the person or persons appointed by the Council to conduct the trial.

XIV. The mere figure of merit shall not necessarily entitle a competitor to the prize, which will be awarded by the Council to such rifle as shall, in their opinion, combine accuracy with other elements of efficiency, so as to be of the greatest merit and utility for military purposes. Should no rifle be found to attain the standard which, in the opinion of the Council, is necessary for efficiency and serviceableness as a military rifle, the prize will not be awarded.

Peat as a Steam Fuel.

The value of peat, when properly dried, is well-known and admitted both for domestic fuel and for generating steam; and charcoal properly made from such peat is, in all respects, equal, if not superior to wood charcoal. When dug from the bog, peat generally contains from fifty to seventy-five per cent of water. The difficulty of getting rid of so much moisture has led to a preference for the upper portions of the deposit, which abound most with roots and coarse fibers, and part most readily with the water not actually shut up within those fibers. But this produces an inferior fuel which will not stand the blast nor make a good charcoal. The inference drawn from practical experience is, that to insure commercial success in utilizing peat, the operation must be inexpensive and expeditious, costly machinery being avoided. To produce a perfect fuel the coarse roots must be removed and the smaller fibers broken up. These objects appear to be accomplished by a simple machine, the invention of Mr. Buckland, which was to be seen in operation at the International Exhibition, 1862. The fuel prepared by this process is called condensed peat, in contradistinction to compressed peat. From four to five tuns of peat as taken from the bog are required to make one tun of dry condensed peat. The cost varies in different localities, but it may be safely assumed that the average cost will not exceed that of coal at the pit's mouth. Peat thus prepared burns very freely, will stand a powerful blast, emits great heat, is smokeless, and produces less ash than the average of coal or coke. It is impervious to water, improves by keeping, and is incapable of self-ignition. From two and a half to three tuns of prepared peat will make one tun of excellent charcoal, according to the degree of carbonization required.

The general heating power of the condensed peat has been proved to be very superior to that of coal; and, in fact, this article appears to be well adapted as a fuel for steam engines, whether marine, stationary, or locomotive. Its use has been found to effect a saving of fifty per cent in time in generating steam, and it will do double duty as compared with coal. The absence of smoke and clinkers, and the preservation of furnace bars and boilers from the destructive effects of sulphur from coal, are additional and important advantages. The peat has been tried on board a river steamer with perfect success. The vessel was under steam 2 h. 20 min., during which time the total quantity consumed was 12 cwt., the average consumption of coal for a similar trip being 12 cwt. per hour. It should be observed that the full effect of the fuel was not here obtained, as the fire-bars, being of the ordinary description, were too wide apart for peat, consequently a portion fell through only partially consumed.

The locomotive engineers of these railways in Ireland united to carry out a practical trial of the condensed peat, on the Belfast and Northern Counties Railway, with the view of testing its qualities as a fuel for locomotives. The trip was made from Carrick junction to Ballymena, a distance of tweny-seven miles. During the whole of the journey their was an excess of steam, although the fire-door was kept continually open, and the damper down, for the greater portion of the distance. The pressure at starting was 100 lbs. per square inch. The commencement of the journey was up an incline of 1 in 80, four miles long, and with double curves; while ascending the incline the pressure rose to 110 lbs., and afterwards to 120 lbs., and this with the fire-door open. The speed was about 40 miles per hour. While on the way the fuel emitted no smoke, and very little when at stations. The fire-box was examined at Ballymena, and a very small portion of clinker was found. The smoke-box was perfectly free from cinders or dust—a proof that the fuel had stood the blast exceedingly well; and it is the recorded opinion of the experimenters that the condensed peat was in every respect well adapted as a fuel for locomotive purposes.—*Mechanics' Magazine.*

Qualities of the Best Vegetables.

There is so wide a difference in the qualities of vegetables, that we are frequently surprised to see the indifference in regard to the purchase of vegetable seeds for sowing and planting. This is an error, which may readily be corrected. No person who desires garden esculents of fine quality need be without the best, if he will only take the trouble to make his selections of seeds with a little more than usual care. Somebody has laid down the following as a criterion to a certain extent, by which the quality of some leading esculents may be determined. We think him right, and commend his views:—

"In the blood beet we always look for a deep color, smooth, handsome form, small top, and sweet tender flesh. In the orange carrot, small top, smooth root, and deep orange color. In the cabbage, short stump, large, compact head, with but few leaves. In the cucumber, straight, handsome form, and dark green color. In the lettuce, large, close head, pleasant flavor, with the quality of standing the heat without soon running to seed. In sweet corn, long ears, very shriveled grains over the end of the cob. In the Cantelope melon, rough skin, thick, firm flesh, and high flavor. In the water melon, thin rind, abundant and well-flavored juice, and bright red core. In the onion, thick, round shape, small neck, deep color, mild flavor, and good keeping quality. In the parsnip, small top, long, smooth root, and rich flavor. In the pea, low growth, full pods, large and tender peas, rich flavor. In the scarlet radish, deep color, small tops, clean root, and quick, free growth. In the squash, medium size, dry, fine grained, deep-colored flesh. In turnips, handsome form, small tops, and tap root, sweet crisp flesh."

Those who have never seen better sorts than they possess, suppose they are of the first quality, when they may be very inferior or almost worthless compared with the finest varieties.—*Culturist.*

Reduction of Work at the Springfield Armory.

By order of the chief of ordnance, Major Laidley is about to reduce the product of the armory to five hundred guns daily, beginning the decrease with the entire suspension of night work. The former large product—one thousand guns a day—has been considerably lessened of late, the number during the last month having been between six and seven hundred per day. The cause of the proposed reduction is obvious, A large part of the machinery at the armory must soon be remodeled for the construction of the breech-loading rifle, which the War Department will doubtless decide to accept, in accordance with the recommendation of the military board which has been in session in this city, and recently adjourned. As this is to become eventually the arm of the service, it is not desirable to increase much more the number of guns of the old model, especially as those now stored in the arsenal count up nearly three hundred and fifty thousand, and as the war is so near its close. Probably none of them will ever be made over into breech-loaders, and the manufacture of the latter, after the necessary change of machinery is made, will keep the armory busy for some time to come.—*Springfield Republican.*

We understand that MM. Margueritte, Lalouet, de Sourdeval, and Worms, of Romilly, have established at Bondy a large factory of sulphate of ammonia, producing daily from 7,000 to 8,000 kilogrammes. The raw material is the liquor of the Bondy basins, which is merely the liquor of cesspools left to stand for a time sufficient to exhaust the fermentation, and transform the urea into carbonate of ammonia, the solution of which is decanted.

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Improved Grain and Seed Separator.

This machine is an efficient one for cleaning and separating all kinds of grain that may have been accidentally mixed in the barn or the mill. It is convenient for farmers, or persons who have but little of this kind of work to do, and may be purchased and held in common by two or more parties, so that the expense comes lighter upon the individual.

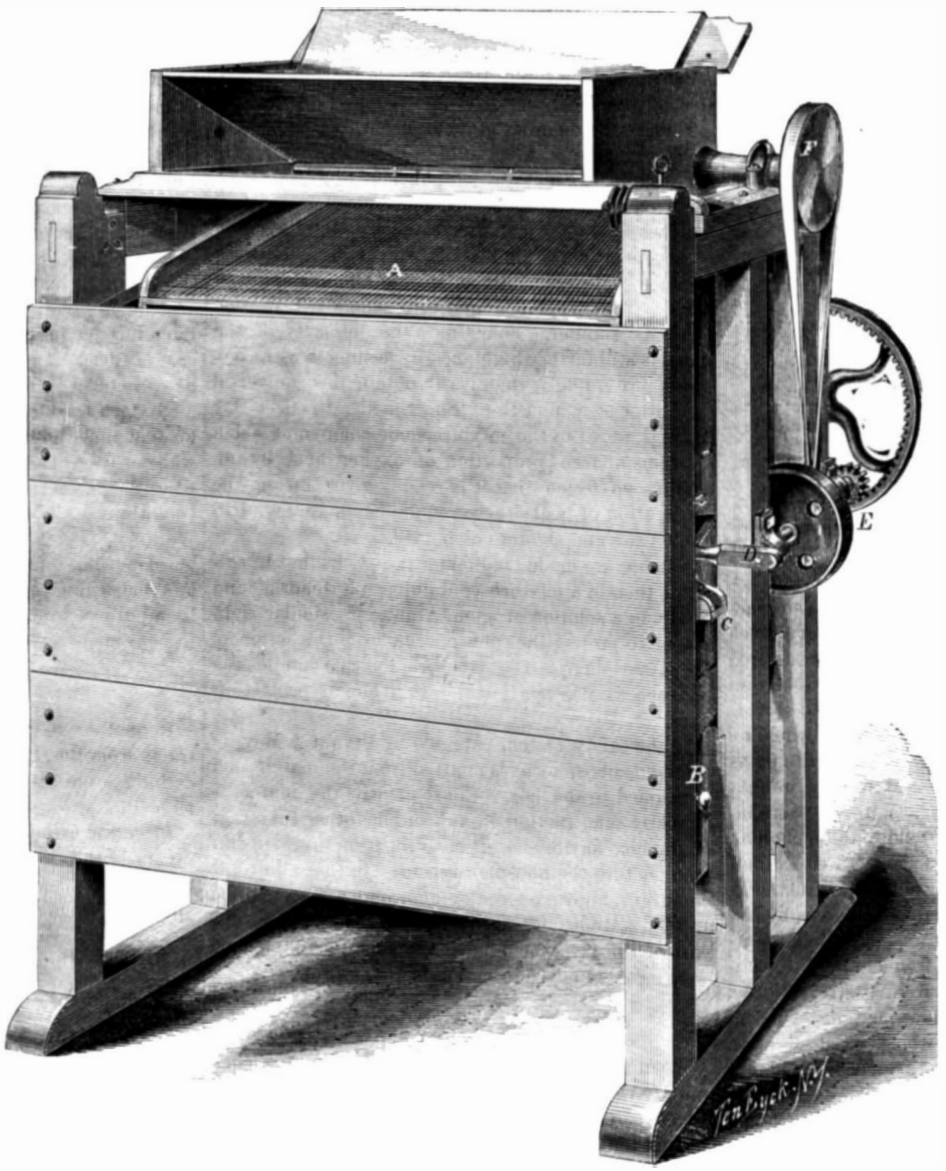
The object of the machine having been stated, it is necessary to add that the work is performed by means of different sizes or degrees of fineness in the meshes of the screens, one of which is shown at A. The grain that remains on the screen without passing through is thrown off by the agitation into a space or channel directly in front of it, and from this channel the grain finds its way into one of a series of drawers or compartments, as at B, or out through the spout, C, from which it is received in suitable vessels. All the screens are hung in a vibrating case, which is operated by the rod, D, through the gear and pinion, E. On the gear there is a handle, and the pulley, F, drives a feeding roller inside the hopper, said roller being channelled out so that the grain is thrown on to the screens as fast as it is required, and no faster, thus avoiding all crowding and choking, and preventing the grain from being mixed in the compartments by accidental spilling over the screens.

This machine separates shrivelled wheat from sound, and No. 1, or first quality, from inferior sorts, and all chess, cockle, hay seed, peas, oats, buckwheat—in fact any grain is carried separately to a certain place in the machine, from which it is easily removed in bulk.

The inventor says of his machine: "The most experienced farmers acknowledge that more bushels and plumper and better grain can be raised on an acre when they are sown mixed than when separate, and also that grain is not so liable to be attacked by insects sown mixed. If it is desired the farmer can sow buckwheat to subdue an old sod, to kill weeds and insecsts of all kinds, leaving the ground clean and in fine condition for sowing barley, oats, peas, flax and other seeds, which, by rotation, could not formerly be done, on account of the buckwheat remaining in the ground and growing with the following crop, thereby injuring it for market or seed. Wheat and oats can be sown together in any proportion if desired, thereby giving the farmer two chances for a crop, for if the season or soil should not be adapted to both the chance for one would still be good. Buckwheat, oats, peas and flaxseed can be sown together and perfectly separated. Spring wheat sown in where red winter wheat or barley has been winter killed is separated at one operation. No. 1 wheat will have the appearance of red winter wheat so much that the best judges have pronounced it such. The machine is so arranged that the miller is instantly notified of the slightest variation in the feed, and when once properly started the machine will regulate the feed to its motion perfectly, without any attention from the operator."

At a recent trial of this machine at the West, in connection with another, it did the work very thoroughly, and completely distanced its rival.

A patent is now pending on this machine through the Scientific American Patent Agency, for certain improvements in a previous patent obtained through this office. For further information address John S. Bodge, patentee, Tecumseh, Mich.



BODGE'S GRAIN AND SEED SEPARATOR.

Iron Dish Cloths--Iron Clothes Lines.

I was once so ill-informed, says a writer in an exchange, of the progress of the fine arts as not to know what an iron dish cloth was. But seeing one in use at the house of a friend, I learned from a Swiss gentleman who had presented it to her, that they were in general use in his native country, and he had accidentally seen a cask full at an importer's, which were unsalable in New York, and had become rusty, and looked upon as old iron. I procured a dozen and distributed them among my friends. They soon became bright from use, and are universally classed among those articles which "we wonder how we ever did without." These are made of rings of iron wire, No. 15, linked together, and are about six inches square; I counted fifteen rings on one edge. One outside row of rings is only connected with the other at each end and one inch or two in the middle which makes two loops to hang it up by.

Every kitchen maid who had scoured the inside or outside of a kettle with it pronounces it better than scraping with a knife or scouring with cloth and sand. They are very flexible, and I imagine must be like chain armor, which I have read of but never seen. We also find it useful to put under a pot or kettle hot from the stove, when we wish to place them on the table. We have used ours two years.

There is another iron convenience I have used six years, and which is as good as ever, that I would recommend to house-keepers—galvanized iron telegraph wire for clothes lines. It never rusts, need never be taken in, never breaks down and lets the wet clothes fall to the ground and have to be rinsed again.

PARIS INTERNATIONAL EXHIBITION OF 1867.

The number of *l'Invention* just received contains the report of M. Armand Behic, Minister of Agriculture and Public Works, on the plan for the great international exhibition of the products of agriculture, industry and fine arts, decreed by the Emperor in 1863 to be held in Paris in 1867. The report states briefly the financial results of previous exhibitions in London and Paris. At the first great exhibition in London, in 1851, the receipts were $2,500,000, and the profits were $1,000,000. The receipts of the second exhibition in London, in 1862, were $300,000; barely sufficient to cover the expense.

The expense of the Paris exhibition of 1855 was borne by the government; the receipts were $600,000 being $1,600,000 less than the cost.

M. Behic estimates the cost of the exhibition of 1867 at about $4,000,000, and the receipts at $1,400,000 to $1,800,000. He proposes that the deficit of $2,500,000 should be appropriated one-half by the city of Paris, and the other half by the imperial treasury, and that a company should be organized to furnish the balance of the funds required, these to be reimbursed from the receipts. In case the receipts should amount to more than the sum contributed by the company, the excess to be divided equally between the imperial treasury, the city and the company.

Titanium in Quantity.

Endeavors, which promise to be successful, are being made to produce in quantity, in the free form, the metal titanium, the question of the influence of which upon steel has at various times been the subject of so much controversy. These endeavors have been prompted by the belief that the light of burning titanium admits, like that of burning magnesium, of important practical applications. As yet, Wohler is the only chemist who has made —or, rather, perhaps we should say, who has published the results of—researches of any importance with respect to metallic titanium, and he has obtained the metal only as an amorphous gray powder, resembling iron reduced by hydrogen at a low temperature." He obtains the metal in this state by reducing the fluo-titanate of potash by means of potassium. Heated in the air, this powder "burns with lively scintillation. The smallest particle of it, projected into a flame, produces a brilliant star-like spark. Heated in oxygen, it occasions an instantaneous dazzling flame like lightning." Wohler believes that "there is no other body which burns so energetically in oxygen." It also burns with a vivid flame, accompanied by intense heat, in nitrogen.

PLASTICITY OF SULPHUR. MM. Moutier and Dietzenbacher presented a note to the Academy of Science on "A Property of Sulphur." The second of these gentlemen showed some time ago that sulphur melted with a small proportion of iodine retained its plastic state. The authors now show that a number of other substances, naphthaline, paraffine, camphor, oil, wax, etc.—confer the same property. The mixture with some of these substances is insoluble in sulphide of carbon. Carbon also greatly modifies the properties of sulphur, rendering it completely fluid at 270°.—*Chemical News.*

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NAVAL DISCIPLINE.

At the opening of hostilities our navy was so inadequate to the duties required of it that, as all well know, quantities of merchant vessels were chartered and crews enlisted to work them. These vessels so manned were in no more condition for naval service than a country regiment on "trainin' day" would be to attack fortifications, and only after infinite pains and labor on the part of authorities were they brought to a state of usefulness. Acting engineers were insurbordinate in one sense; they could not be made to understand that rank and capacity were two different things; though the engineer might be in all things the superior, the next in rank above him was by law his commander and to be respected. Much derangement and many resignations occurred, and reputations previously untarnished were destroyed from this simple cause. Men who had spent all their lives in the merchant service and whose word was law, even to the owners and captains, felt that submission to a lieutenant was equivalent to degradation and sooner than put up with it resigned pay and the chance of prize money. Where such cases have occurred among engineers it is not unlikely that the sea faring branch of the service has been troubled in the same way, but it is creditable to the good sense of both classes that a short time sufficed to settle this trouble and that the acting appointments, which means persons chosen from the merchant service and not regularly bred to the navy, have of late given but little trouble.

Naval discipline has done much for the merchant service in this respect and it is one of the great benefits which the people, or that portion of it which go down to the sea in ships, will derive from the outlay of money during the struggle. Obedience and deference to superiors, which is indispensable to efficient action on ship board, will be accorded cheerfully and not grumblingly. The ships themselves will be better cared for in all that relates to matters sanitary and mechanical. A laudable and praisworthy desire to excel incited by the publicity given to individuals during the war, will result in shorter voyages, decreased expenditure, and better treatment of the crew. With the steam marine, observation and the routine required by the Bureau of steam engineering in making out reports, will develope and stimulate mental activity in the profession which is much needed, and cannot fail to produce good results.

It is easy to see that in many minor details, such as inducing habits of personal cleanliness among seamen, who are not generally given to morning toilets, attention to the minutiæ of sea-faring life, merchants and ship masters will be gainers by the system of naval discipline with which our merchant marine has been inocculated; while in the event of a foreign war our coast will swarm with such a host of privateers, with efficient crews, that it would be easier for a cannon to be loaded through the vent than for an enemy to escape them.

SAFETY MATCHES.

Phosphorus has a very strong affinity for oxygen, so strong that it slowly combines with it when exposed to contact with the atmosphere, producing a glow visible in the dark. By raising the temperature slightly this combustion is augmented to rapid burning, and this elevation of the temperature may be readily effected by moderate friction. This property of phosphorus has rendered possible that immeasurable convenience, the friction match.

Though the quantity of heat in burning phosphorus is pretty large—5700 units to the pound—the heat is not intense, generally not sufficiently intense to set wood on fire. It is, therefore, necessary in making matches to employ a third substance which the flame of phosphorus will kindle, and which will in burning produce heat sufficiently intense to kindle a splint of wood. The substance generally employed in this office is sulphur. Sometimes the intensity of the flame is still further hightened by feeding it with oxygen more rapidly than it can obtain this universal supporter of combustion from the air; to effect this there is added to the mixture some compound which contains a large proportion of oxygen held by an affinity so feeble that it is readily given up on the application of heat; these requirements are found in the nitrate and chlorate of potash.

Matches are made by dipping the sticks first in sulphur, then in a mixture containing phosphorus, and finally in a solution of gum Arabic or similar substance to protect the phosphorus from the action of the atmosphere. The same friction that kindles the phosphorus also removes the thin film of protecting gum.

In the safety match, patented by Bryant & May, of England, phosphorus is omitted from the match, and is applied to the box. Consequently the match is perfectly safe, friction on any surface other than that of the box having no effect to set it on fire. In this manufacture the phosphorus is used in that allotropic condition known as red or amorphous phosphorus. In this state it does not produce that frightful disease of the jaw which has made such havoc among workmen employed in match manufactories.

COAL.

When gold commanded a high premium the community were told that as a consequence coal must necessarily be dear. When trade strikes and riots among the miners disturbed operations in the coal fields the public were informed that these actions were the cause of scanty supplies and high prices for the staple. When Lee made his great raid into Pennsylvania similar reasons were advanced to keep up the price of fuel. When the spring freshets occurred the bridges were declared destroyed, and only limited supplies could be got over them. When the navy was building its iron-clad fleet and arsenals, and contractors were running their works night and day, the enormous and suddenly-increased demand for coal enhanced its value, so that rates before unheard of were obtained for it.

It is a poor rule that won't work both ways. If coal goes up under the existence of certain conditions it ought to come down when they change. Gold no longer commands the price under which coal was run up to $14 per tun. There are no trade strikes among miners. Lee is annihilated. The Confederacy is no more. The bridges have all been repaired. The navy has built its iron-clads. Contractors have filled their engagements. Government arsenals are shortening their force, and consequently their productions; the blockade is virtually terminated. Yet, in the face of all this, coal remains at an astounding and unwarrantable price when compared with other necessaries of life.

The fact of the matter is, that railroads and great stock companies who depend upon the exorbitant prices now obtained for fuel for the means to declare dividends, have conspired together to keep up its price, and they humor the market accordingly. For each day's needs they run in enough to supply but not glut the market, so that the figures remain unchanged. Along the line of the New Jersey Transportation Co.'s Railroad, and on other railroads, may be seen quantities of coal cars standing ready to be delivered at points where they are needed. It requires very little perspicuity to see that if these cars were run to their destination without other delay than the natural exigencies which occur in business of every kind, the market would be overstocked, and prices would fall, to the confusion of speculators and profit of the people.

THE FOLLY OF STRIKES.

The folly and absurdity of strikes is well illustrated by the termination of the great English "Lock-out." The correspondent of the London *Engineer* says:—"Now that the struggle is over—that is in the north—both parties may not unprofitably review their respective positions, and inquire what the lock-out has done for either of them. The men lost a fortnight's wages. Nothing more. They began work again on Thursday night on the same conditions as they were locked out on Saturday three weeks. The masters lost the profit on their works during that time. There are about 700 puddling furnaces in this district. Each furnace in round numbers may be said to have cost £1,000. There has, therefore, been something like £700,000 of capital lying idle and unproductive for sixteen working days. The men lost their wages for that time, and the employers lost their profit, and who has been benefitted? No one. Work was resumed in the northern iron factories on exactly the same conditions as it ceased nearly three weeks before." Workmen should understand that all persons or journals who endeavor to draw a line between them and their employers are their enemies, who have some base purpose, and care little what misery they cause to poor men so that they gain their ends.

PEAT.

In another part of this issue we have given extracts from the London *Mechanics' Magazine*, concerning some interesting experiments made with peat as fuel for steam engines—locomotives in particular.

From the article it appears that the most extraordinary results were obtained with peat when deprived of its moisture, and condensed by a machine specially designed for the purpose. It may be that in peat we shall find an economical substitute for coal; at its present prices, and even at rates much below, for the marketing of the former substance or preparation of it so as to render it available must certainly cost far less than for coal. No shafts have to be sunk no extensive and costly system of engineering and surveying are needed, and beyond the expense of the machinery for condensing it, or getting the water out of it by mechanical processes, little seems to be required to utilize the deposit with which nature has covered large tracts of land in this country.

The Chicago *Tribune* thus speaks of a sample of peat which it has received from parties owning one bed which is estimated to contain 250,000 cords:—

"This peat, in color, resembles the outside of pressed tobacco that has been exposed to light and air, and is quite as hard and heavy. The internal structure is so compact that on cutting it with a knife a smooth polished surface is formed. The specimens that we have burn with a flame clear and brilliant as seasoned maple or hickory, and produce no unpleasant odor like coal. Specimens of the peat have been exhibited to Dr. A. A. Hayes, of Boston, analytical chemist; Dr. E. Carr, Professor of Chemistry in the Wisconsin State University, and other distinguished practical men, and they speak highly of its merits. Professor Hayes says 'its flaming quality is of a marked character,' and that 'the inflammable part has a high heating power, and burns freely and clearly from the ash. Take the 59 parts of the inflammable compounds, as representing the positive combustible matter of this peat, we have an equivalent closely corresponding to that of oak wood; and I am led by my results to expect an equal heating power from an equal weight of this peat, burned in comparison with wood.' In regard to its gas-making powers, Prof. Hayes says, 'it exceeds all com-

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mon cannels, and of course is far above any bituminous coal, and can be worked with *poor* coal to make *good* gas. There are only two or three cannel coals known which afford so much illuminating material, placing this peat in the first class of gas materials.'"

In former numbers of the SCIENTIFIC AMERICAN much has been said regarding this substance, and one of our large iron workers having tried it was not impressed with its great utility, but where such striking results as that recorded in the *Mechanics' Magazine* are obtained, and the testimony of scientific men is freely given as to its value it would seem that further experiment here would be likely to establish its character as a cheap and valuable fuel.

THE WAY TO LAY OUT AN ORCHARD.

If the proper method is adopted it takes less time and labor to set the trees of an orchard in perfectly straight rows both ways, than it does to set them in very crooked rows by the ordinary method of looking backward to get in range with the trees already set. The writer of this has set many orchards and has finally adopted the following plan:—

After the ground is plowed and harrowed, rows of small, straight stakes or pins are first inserted in the ground, not precisely in the positions to be occupied by the trees, but all on one side, say the west side for instance, in order that the holes may be dug and the trees set without disturbing the stakes.

The best way to get the position for the pins is to stretch a stout twine across the field, and then measure along this line from one pin to the next with a wooden pole of a length equal to the distance between the trees. A cane fish pole makes the best measuring rod, and next to this a slender white pine sapling, cut green and seasoned under cover. The pins should be straight twigs 8 or 10 inches in length and about a quarter of an inch in diameter; they may be cut from hazel or any other bush that grows straight.

First stretch the twine across the east side of the field, two and a half feet west of the line where it is desired to have the first row of trees. Set a pin in the place for the north row of trees, and measure along the twine with the rod, sticking a pin into the ground at each rod's length. Then lay off right angles from the extreme north and south pins, stretch the line and measure as before, leaving the pins standing, to the place for the west row of pins; stretch the line between these, and complete the measurement around the orchard. Finally stretch the line along the several north-and-south rows, and beginning at the north side measure along the line setting a pin for each tree. We shall thus have the ground marked out in squares with the pins all standing two and a half feet west of the positions to be occupied by the trees.

Now dig the holes on the east side of the trees, with the center of each hole about two and a half feet east of a pin. The holes should have vertical sides and flat bottoms, and should be sufficiently large to receive the roots in their natural position without bending. Provide a straight wand two and half feet in length, and placing one end of it against the pin, set the tree opposite the other end, ranging with the stakes to the west, and disregarding those to the north and south as the rows that way will take care of themselves. Pour two pailfuls of water into the hole, and sift in fine dirt from a shovel till the hole is filled. If the orchard is large so as to require a long line, a little art is required to draw the line straight. The stake at one end is firmly inserted in the earth, when a man by taking hold of the opposite end and shaking it vertically up and down, at the same time pulling upon it about as hard as its strength will bear, can very quickly whip it into a straight position; a few sods or stones may then be laid upon it at intervals to hold it in place.

In measuring, one man lays the rod along the line with its heavier end just opposite the pin already set, and another inserts a pin opposite the smaller end just one side of the line. The man who sets the pins should first stand astride of the line and insert the pin, and should then step around so as to face the line at right angles, setting the pin the second time if it should be found not to stand in a vertical position precisely opposite the end of the pole.

It may seem at first that this plan would be more laborious than the ordinary method of ranging, but in practice it will be found easier and more expeditious, as the work moves steadily forward without interruption or delay. We once planted an orchard of three acres with small peach trees by this method, and looking at the rows either directly or diagonally not a tree could be seen a single half inch out of line.

"Beelzebub."

Beelzebub is the name given to the new twenty-inch gun just completed and prepared for proving at the Fort Pitt Works. It is a Dahlgren navy gun, weighs as finished 98,915 pounds, and will throw a solid shot weighing 1,080 pounds to a distance, it is calculated, of over six miles. This has been done by the mate of this gun, which is mounted in New York Harbor. The gun was cast on the 5th of May last, was taken from the pit on the 22d of June, and has since been brought to its present perfection of finish, the equal of any gun in the world. Its rough measurements were as follows:—

	Inches.
At the base	66
30 inches from the base	65
60 inches from the base	61
80 inches from the base	54
120 inches from the base	48
175 inches from the base	47

Its finished dimensions were as follows:—

	Inches.
At the base	64
40 inches from the base	63.05
60 inches from the base	58.40
80 inches from the base	55.50
100 inches from the base	44.34
120 inches from the base	32.80
175 inches from the base	34.09

The bore star gaged zero, or exactly twenty inches, the entire distance, except at four places; when it varied the one-hundredth part of an inch.

This immense "shooting-iron" is now in readiness for removal to the proving ground, when it is to to be tested by nine discharges, firing a solid shot with each, three of which will be with a charge of 60 lbs. of powder, three with 80 lbs. two with 100 lbs. and one, in all probability with 125 lbs. No notice will be given publicly of the day of proving as it is desirous to avoid the presence of a crowd on the occasion.—*Pittsburgh Chronicle.*

Steam on Common Roads.

The *London Engineer* thus speaks of some of the causes which have prevented the practical use of steam on common roads:—

Amateurs have rushed in where engineers fear to tread. Those gentlemen, with the best intentions, no doubt, combine an astonishing amount of ignorance with an audacity now and then bordering on the sublime. In the attempt to do everything they achieve nothing. Moderate speeds are regarded as ridiculous. The weight, which is rendered absolutely necessary by the necessity for a considerable heating surface, is quietly set down as being excessive. Machinery is contrived without any consideration for the strains to which it is exposed, and, as a result, a very few miles of bad or indifferent road suffices to render the engine helpless. A tenth part of the practical skill which has done so much for other forms of steam machinery would suffice to render the steam passenger carriage a machine which could be built with profit, and worked after a fashion which would quickly return fair dividends in countries or districts where an opening of the proper character exists for the display of its powers.

[When shall we have this practical skill.—EDS.

SPECIAL NOTICES.

ULYSSES PRATT, of Deep River, Conn., has petioned for the extension of a patent granted to him on the 6th day of July, 1851, for an improvement in process of bleaching ivory.

RICHARD DUDGEON, of New York City, has petitioned for the extension of a patent granted to him on the 8th day of July, 1851, for an improvement in portable hydraulic presses.

Parties wishing to oppose the above extensions must appear and show cause on the 19th day of June next, at 12 o'clock, M., when the petitions will be heard.

COMPOSITE SHIPS.—Mr. John Smurthwaite, Pallion, Sunderland, is constructing a vessel on the combination principle, but in which a new feature is being introduced. Her floors are of wood, constructed as wooden ships usually are, whilst her frames are of trough iron, 6 in. on the flat and 4 in. on the depth, and she is being built entirely by wood shipwrights. Competent judges declare that she will be one of the strongest vessels that has been built on the Wear. We understand she is the second ship of the kind built in England.

[Many such ships have been launched in this country.—EDS.

ISSUED FROM THE UNITED STATES PATENT-OFFICE
FOR THE WEEK ENDING APRIL 18, 1865.
Reported Officially for the Scientific American.

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

47,264.—Apparatus for Agitating and Kneading Substances.—Wm. Adamson, Philadelphia, Pa.:

I claim, first, The cone-shaped roller caused to traverse in a circular path and to revolve on its own axis in a closed vessel within which pressure is maintained by the introduction of steam or otherwise, all substantially as and for the purpose herein set forth.

Second, The combination of the vat, having either an open or closed top with the central shield, H, and the traversing and revolving roller.

47,265.—Crutch.—G. T. Allamby and John G. Bugbee, Bangor, Maine:

We claim a spike, C, inserted in a metal socket, B, placed on the lower end of a crutch or cane and provided with a spring, D, and an arm, E, the latter extending through a slot, F, in the socket, all arranged to operate substantially as and for the purpose set forth.

[This invention relates to a new and improved manner of applying a spike to a crutch or crane, whereby the spike may, by a very simple adjustment, be made to protrude from the lower end of the crutch or cane, and prevent the latter from slipping on ice or other smooth or slippery surfaces, and the spike, when not required for use, be, by an equally simple adjustment, withdrawn into the crutch or crane.]

47,266.—Time Reporter.—Theodore Ascherfeld, Elkton, Md. Ante-dated April 17, 1865:

First, I claim the plates, C D, having pointed projections, c d, and apertures, c' d', for securing the dial, E, and preventing the position of the same being changed without detection, substantially as and for the purposes specified.

Second, I claim the metallic plate, G, applied beneath the dial, E, and aperture, A2, to prevent the entrance of a pointed instrument, as described.

Third, I claim the cloth, G', placed beneath the aperture, A2, and saturated with printer's ink or other suitable material or covered with transferring paper for preventing fraudulent inscriptions, as explained.

47,267.—Lantern.—J. S. and T. B. Atterbury, Pittsburgh, Pa.:

We claim, first, Securing in place the guard frame of a lantern in the act of securing the metallic mountings or collars to the globe of the lantern, substantially as described.

Second, The combination of screw collars, rings or mountings, B B', with a wire guard frame, and a globe adapted to receive the same, substantially as described.

Third, A lantern globe constructed substantially as described.

47,268.—Globe Lantern.—James B. and Thos. S. Atterbury, Pittsburgh, Pa.:

First, We claim a signal globe lantern having one or more signal plates, b, applied to it, substantially as described.

Second, The combination of a reflector, a, signal plate or plates, b, and lantern globe, A, substantially as described.

48,269.—Making Printed Felt Hats.—Alfred Bailey, Amesbury, Mass.:

I claim as my invention my improved mode, as above described, of making a printed or embossed felt hat.

47,270.—Feed Bags for Horses.—A. T. Ballentine, New York City:

I claim the combination of the flexible bag, A, head stall, a b, rope, B, sheave, C, and adjusting loops, c, all as herein described and for the purposes specified.

[This invention relates to a new and improved feed bag to be applied to a horse so that the latter may eat therefrom while in harness, and without the aid of any support or fixture for the bag to rest upon.]

47,271.—Self-lubricating Spindle Bolsters of Spinning Frames.—Stephen S. Bartlett, Providence, R. I.:

First, I claim the combination with the bolster and casing of a spinning frame spindle of a vertical groove, d, and oil hole, g, substantially as and for the purposes described.

Second, The combination of the groove, m, in the upper part of the bolster, C, with the vertical groove, d, and oil hole in the casing, substantially as and for the purposes described.

Third, The combination of the circular grooves in the bolster and casing with the vertical groove, d, and oil hole, g, substantially as and for the purposes specified.

Fourth, The combination with the bolster, C, of a casing, a, having a vertical groove, d, oil hole, g, and inner spiral groove, n, substantially as and for the purposes specified.

47,272.—Apparatus for Carbureting Air.—John A. Bassett, Salem, Mass.:

First, I claim the general arrangement and construction of the apparatus as shown and described.

Second, The carburation of air or gases by the submerged serrated tubes in combination with the reservoir, substantially in the manner described.

Third, The combination of a power meter, constructed substantially as described, with an apparatus used to aerate and vaporize liquid hydro carbons, the whole operating together in the manner and for the purpose substantially as set forth.

47,273.—Barrel for Holding Oil.—John A. Bassett, Salem, Mass.:

I claim the herein-described compound, consisting of the materials specified, or their equivalents, when used for lining or coating barrels or other vessels, substantially as set forth.

47,274.—Waste Saving Attachment to Cording Engine.—Anthony A. Bennett, Norwalk, Conn.:

First, I claim the combination of the curved shell waste saver, A, having a plain face and the receptacle guard roller, c, or their equivalents, in the manner and for the purpose substantially as herein described.

Second, The clearing brush, G, or its equivalent, operating in combination with the waste saver, A, and the guard roller, c, for the purpose described.

47,275.—Fire Proof Roof Composition.—N. E. Blake, Almond, N. Y.:

I claim the within-described composition, made substantially in the manner and proportions as set forth.

47,276.—Harness Saddle.—Politorus Bottyer, Newark, N. J.:

I claim inserting the rein hook in, and securing it to, the saddle-

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tree, as hereinabove specified; also holding the parts of the saddle together, in the manner described, when so held in combination, with the improved manner of holding the hook.

47,277.—Whip Socket.—James F. Brewer and Enos E. Stow, Plantsville, Conn.:

We claim the securing of whip sockets to the dash-boards of vehicles by means of straps passing alternately in and out through slots or openings in the socket, substantially as herein shown and described.

[This invention relates to an improved mode of attaching whip sockets to the dash-boards of vehicles by means of straps.]

47,278.—Self-Lubricating Spindle Bearing for Spinning, etc.—George W. Briggs, Fiskeville, R. I.,

I claim in upright and inclined bearings the cup or socket, D, attached to and revolving with the spindle, in the described combination with the spiral groove, G, in the bearing, C, for the purposes set forth.

47,279.—Sawing Machine.—Victor H. Buschmann, Baltimore, Md. Antedated April 17, 1865:

First, So arranging and supporting feed and pressure roller frames, B B', which are controlled by a central force that, while they will preserve their parallelism and accommodate themselves to boards of different thicknesses passed between them, they are also allowed to deviate from parallel planes and accommodate themselves to boards of uneven or unequal thickness, substantially as described.

Second, The employment of pressure rollers, f f, or their equivalents, applied so as to guide and hold the ends of the boards up to the saw after leaving the main pressure rollers, substantially as described.

47,280.—Combined Spittoon and Foot Warmer.—George B. Clarke, Leonardsville, N. Y.:

I claim a combined spittoon and foot warmer, or furnace, constructed substantially as described.

47,281.—Artificial Leg.—Richard Clement, Philadelphia, Pa.:

First, I claim the removable pin, I, when used in the manner and for the purposes specified, substantially as described.

Second, The cord, L, in combination with the pulley, M, and spring, N, when constructed in the manner and for the purpose specified, substantially as described.

47,282.—Treadle Motion.—Albert L. Dewey, Westfield, Mass.:

I claim the spring, E, and hub, D, applied to shaft, A, substantially as shown and used, in connection with a foot treadle, all arranged to operate in the manner substantially as and for the purpose set forth.

[This invention relates to a new and improved treadle motion designed for turning lathes, sewing machines, and all other devices in which motion is given a rotating shaft through the medium of a foot treadle.]

47,283.—Guide for Piston Rods.—Edward Dunscomb, Boston, Mass.:

I claim as my invention, in a crank eccentric or any equivalent motion or movement, the employment and application of anti-friction rollers, substantially as hereinbefore described.

47,284.—Balanced Slide Valves.—Charles E. Emery, Brooklyn, N. Y.:

First, I claim the combination of a valve, of the kind or style above specified, with its seats in such a manner that when the parts, a and b, of the valve are secured together, or cast or formed in a single piece, the whole valve may be inserted in or removed from its place, by putting one part, b, through an opening, c, in one of its seats, a', substantially as described and as shown in the figures numbered 3.

Second, The use of the supports, a'' a'', Figs. 4, or their equivalents, between the valve seats, a' and b', and of the standards or supports, s s, between the parts, a and b, of the valve, with actual or metallic contact at such of their joints as can vary the distance between the valve seats or faces, combined in manner described, to secure the purposes herein specified, with a common joint, of any reliable kind, to prevent leakage, substantially as shown and applied in Figs. 4, between the steam chest, seat, a', and cover, D.

Third, The combination, to accomplish the purposes intended and specified, of a double-faced slide valve, of the kind or style to which these improvements are applied, as above expressed, with a steam chest or its equivalent, supporting one or both the parallel valve seats, and so constructed that all joints between the parts of such steam chest or equivalent or between such steam chest and either or both of said valve seats, a' and b', which can vary the distance between said seats, are made in sufficient actual or metallic contact, by scraping, grinding, or other means, to be tight without other appliances, and sustain said seats at a proper and certain distance from each other, substantially as described.

47,285.—Hand Spinning Machine.—Turner Evans, Paris, Iowa:

I claim the combination of the roll receiver, H, the crank shaft, R, the spindle frame, o, the thread guide, m, the shaft, T, with pulleys attached, the bar, G, the pivoted bar, F, spring, W, and the hook, u, the whole constructed and operating substantially as and for the purpose herein set forth.

47,286.—Process of Working Silver Ores.—William L. Faber, New York:

First, I claim the within described process for treating silver ores, consisting of eight different manipulations, as enumerated under the proper heads.

Second, Also the process as modified by omitting the first and sixth manipulations, and treating the ore as described under the second, third, fourth, fifth, seventh and eighth heads.

Third, Also the process as modified by omitting the fourth, seventh and eighth manipulations, and treating the ore as described under the first, second, third, fifth and sixth heads.

[The object of this invention is to work silver ores more economically than can be done by the present process, and it is intended to be applied to real ores of silver, such as occur in Arizona, Nevada, etc., but not to argentiferous lead ores. Where gold occurs with the silver ores, it is all obtained by this process, alloyed with the silver.]

47,287.—Skate.—John P. Farmer, Cambridge, Mass.:

I claim the combination and arrangement of the encompassing toe strap, D, with the slider E, its retracting mechanism, the heel catch, C, and the foot rest, A, applied to the runner, B.

I also claim the arrangement and combination of the screw, F, and the nut, G, with the toe part of the skate runner and the slider, E, and strap, D, the whole being substantially as described.

I also claim the combination and arrangement of the passage, a, with the slider, E, and the screw, F, and the nut, G, arranged at the toe part of the skate runner as described.

47,288.—Hoop Lock for Cotton Bales.—E. Victor Fassmann, New Orleans, La.:

I claim the plate, A, provided with the slots, B B, and ridges or projections, b b, at one or both sides of the plate, and with the slits, a', to form a new and improved cotton bale, tie or hoop lock as set forth.

[This invention relates to a new and improved fastening for securing iron hoops on cotton bales previous to the removal of the latter from the press and which fastenings are commonly termed "cotton bale ties," or "hoop locks." The object of the invention is to obtain a tie or lock for the purpose specified, which may be cheaply manufactured, admit of having the ends of the hoops readily applied or attached to it to secure the hoops on the bales, and which will admit of the hoops being applied to bales varying in size or dimensions.]

47,289.—Mine Pump.—Thomas M. Fell, New York City. Antedated April 7th, 1865:

I claim the combination of the severel devices, viz:—The cylinder, a, connected with the mine pump by the rods, T, exit pipe, S, weight, V, chain, W, condensing apparatus, K Q and L, and the valves, B C R L and O, substantially and for the purpose as herein set forth.

47,290.—Rock Drill Apparatus.—Wm. S. Fickett, Rochester, N. Y.:

First, I claim working the drill by means of a crank composed of a fixed arm, C, and a loose one, C', constructed and operating conjointly, substantially in the manner shown and for the purposes described.

Second, The employment of the locking bar or latch, G, for the loose arm of the crank, said bar having an automatic action substantially as and for the purpose set forth.

47,291.—Stove.—Charles Fownes, Pittsburgh, Pa.:

I claim the annular deflectors, F G, attached alternately to the external case, A, and internal tube, D, in the described combination with a fire chamber from which heated products of combustion are passed through the annular flue so as to heat air in its passage through the air tube, D.

[This invention relates to a new and improved stove of that class designed for giving the draught or products of combustion a circuitous route in its passage from the fire chamber of the stove to the flue so as to cause a greater radiation of heat than when there is a direct draught, and which are also designed for heating air for warming apartments in a building other than that in which the stove is placed.]

47,292.—Churn.—A. O. Gallup, Salem, Conn., and E. A. Hewitt, New London, Conn.:

We claim, first, Forming the sides or bottom of the churn, or both, with a series of sharp pointed spurs or projections, arranged substantially as and for the purpose specified.

Second, The use of the pointed dashers or beaters arranged as described and for the purpose specified.

Third, The combination of the dashers, h h, with projections, f f, arranged and operating substantially as described.

47,293.—Smoke Pipe Damper.—Edward M. Gardner, Nantucket, Mass.:

I claim the combination of the curved damper with the round pipe, and the air inlet, C, such damper being hinged to the pipe and arranged with respect to the said air inlet in manner and so as to operate with the same and the pipe substantially as specified.

47,294.—Plow.—Joseph George, Green Co., Mo.:

I claim the curved coulter bar, B, it having a heel, e, secured to the back brace, b, and beam, A, as described, in combination with the land side, D, and mold board, C, they forming plow shares of various sizes, to be fitted on one stock, the same being secured, and operated substantially in the manner herein set forth.

47,295.—Composition for Cleaning Marble, Etc.—Wm. Ginnaugh, Niles, Mich.:

I claim the within described marble restorative made of the ingredients specified and mixed together in about the proportions and substantially in the manner set forth.

[This invention is intended for cleansing, restoring and purifying marble, namely tomb stones, monuments, etc., exposed to the weather. Such articles are liable to turn black from the influence of the atmosphere and by the application of this preparation with a stiff brush all dirt and spots will be removed, and furthermore the pores of the marks are filled up so as to admit no more dirt or moisture after its surface has once been cleaned. By the use of this preparation a beautiful finish can be given to the marble and it is readily restored to its natural color.]

47,296.—Artificial Fuel.—Gilbert R. Gladding, Providence, R. I.:

I claim a composition fuel composed of the combustible materials above mentioned in combination substantially as described, and held in mass by fine and adhesive clay or similar substances as specified

47,297.—Machine for Crushing Ore, Etc.—Alexander W. Hall, New York City:

I claim the combination of a horizontally moving direct action stamp and a stationary abutment having the upper parts of their working faces convergent and the lower parts thereof parallel, when the movement of such stamp is produced by an eccentric at the rear end of the stamp acting in concert with a sliding journal box near the head of the stamp, substantially as and for the purpose herein specified.

47,298.—Cooler for Breweries.—Adolph Hammer, New York City:

I claim the horizontal partition, a, with a double set of zig-zag flanges, b b, one above and the other below in combination with the pan, A, constructed and operating substantially as and for the purpose set forth.

[This invention consists in a cooler divided in two chambers by a horizontal partition which is provided on its top and bottom with zig-zag flanges in such a manner that the water or other liquid to be cooled can be passed in an indirect current through the upper chamber while an opposing current of the cooling liquid passes through the lower chamber and the cooling of the wort can be effected in a shallow pan in a short time and when covered without exposing the wort to the decomposing influence of the atmosphere.]

47,299.—Pump.—Joseph Hampson and George Ladue, Newburgh, N. Y.:

We claim, first, The arrangement, to lift both suction valves and one discharge valve, by means of small cogs, below the valves, connected by the rods, r1 r3 r4, to the one main rod, P P', and by a spiral spring applied to the rod, P P', as specified.

Second, In combination therewith a solid piston, having an exterior of brass attached, as herein specified.

Third, The application of india-rubber plates on the inside of the cylinder heads, so as to form a packing and a cushion for the piston, all substantially as shown and described.

47,300.—Lap Shaver and Leather Splitter.—John Harvey and Frederick Herkstroder, St. Louis, Mo.:

We claim the adjustable pillar block, a, the pressure roller, d, the gage, e, and the adjustable lock pin, i, arranged and operating in the manner and for the purpose set forth.

47,301.—Separating Gummy and Silicious Matters from Vegetable Fibers.—Chas. Heaton, New York City:

I claim the application of mechanical pressure substantially as described for the purpose of separating gummy or silicious matters from vegetable fibrous materials.

[The object of this invention is to seperate gums, silicious and other surrounding matters from the gums in a simple and expeditious manner, and to substitute mechanical means in part for that purpose.]

47,302.—Wire Broilers or Toasters.—H. A. Hildreth, Lowell, Mass., and W. J. Johnson, Newton, Mass.:

We claim as an improvement in the construction of wire broilers and toasters, the crimping of the ends of the frames for the reception of the bars, or slats, substantially as and for the purpose described.

47,303.—Bayonet Attachment.—Wm. Hoffman, Washington, D. C.:

I claim the form above described of the bolt and plate making part of the frog or attachment, which prevents the scabbard from revolving above the horizontal line on either side.

47,304.—Steam Trap.—Peter Hogg, New York City:

I claim, first, The open mouthed float with its valve collar or their equivalents in combination with the perforated pipe, D, substantially as described.

Second, The use in steam traps of an open mouthed float which opens and closes the orifices for the discharge of water from the trap substantially as described.

Third, The combination of the float constructed substantially as shown with the discharge pipe, D, the casing, A, and the connecting pipe, G, substantially as shown.

47,305.—Gum Elastic Coupling Spring.—Samuel M. Hoover, Carlisle, Pa.

I claim the use of elastic rubber enclosed in a metalic case, constructed and connected, substantially as and for the purposes specified.

47,306.—Calendar Clocks.—Henry B. Horton, Ithica, N. Y.:

I claim, first, The use of the stops or pawls, S and S X, or other equivalent device, for the purpose of fixing with precision, the movements of the month, the day of the week, and the year wheels as described.

Second, The lever cam, f, on the month wheel, J, for the purpose of passing the stop or pawl, K, over the 31st tooth of the month wheel, for months of 30 days, and over the 30th and 31st teeth for February, leap year; and over the 29th, 30th and 31st teeth of said wheel, when February has 28 days, or otherwise using the said lever cam, f, for the same purpose.

Third, I claim the detached lever, a, for the purpose of changing the length of the months, and of February in leap year, in a 31 toothed month wheel; and also the detached lever when acting in combination with the lever cam, f, of the month wheel, the cams on the year disk, and the projections on the four year wheel.

Fourth, I claim putting on, but not fixing fast, the four year wheel to the shaft of the month wheel, as described.

Fifth, I claim the wide cam, e, on the corrugated disk, Z, of the year wheel or its equivalent, for the purpose of carrying the bent rod lever, a, on the projections of the four year wheel.

Sixth, I claim operating the calendar by the slotting of the rod, B, about the shafts of the cam, A, for retaining the rod in its place; and also by the combination of the cam, A, and rod, B, producing the changes of the calendar instantaneously, at midnight.

Seventh, I claim securing by the pin, W, the double flexion of the rod, B, at C, and thus the pawls, T and U; and also holding the lever, H, by the other pin, w, and the pawls under it; and also by the said pins, the pawls, m and k; thereby preventing any displacement of the calandar during transportation.

Eighth, I claim the click, r, for reducing the labor of bringing up the weight lever, n, drawing a period of 72 hours or less, according to the distance the lever falls, by the lengths of different months.

47,307.—Farm Gate.—James G. Hunt, Cincinnati, Ohio:

I claim, first, The hollow cap, composed of plate, C, constructed and applied together and to the gate post, A, substantially as and for the purpose described.

Second, The arrangement of pulleys, g g', on the arm, e, of the segment in combination with the pull-cords, i i', arranged and operating upon the gate and bolt, m, substantially as described.

Third, The levers, D, G, rod, n, and spring bolt, m, applied to a swinging gate which is opened and closed by means of two cords, i i', acting upon a system of levers substantially as described.

47,308.—Cleansing and Revivifying Charcoal.—Gustavus A. Gasper, Charlestown, Mass.:

I claim the washing or cleansing of the charcoal within the filter by reversed currents of water, and by steam applied to it substantially as herein before described.

And in combination therewith, I claim the application of an acid solution, substantially in the manner and for the purpose described.

I also claim the combination and arrangement of the separate blanket chamber with the filter, so applied to the filter as to enable the blanket or blankets to be removed from it without disturbance of the charcoal charge of the filter.

I also claim the application of the exhaust cock, h, and the pipe, t, or either to the side of the filter and to its blanket chamber substatially in manner as described.

I also claim the combination and arrangement of the cistern, F, its pipes, p' t, and the discharge cock, c, with the filter, A', the pipes, p' and t, having stop cocks, b and d, and the whole being to operate substantially as described.

I also claim the combination of the filter, an apparatus or means of causing water to flow through it in reversed directions, and a means of applying steam to the filter or the contents thereof in manner and the whole being for the purpose or objects as specified.

47,309.—Cock.—Nathiel Jenkins, Boston, Mass.:

I claim, first, The swivel, H, in combination with the follower, E, and seat, L, substantially as and for the purpose described.

Second, The combination and arrangement of the thimble, I, swivel, H, and packing, K, substantially as and for the purpose described.

47,310.—Lightning Conductor.—Isaac Johnson, Lodi Station, Ill.:

I claim a lightning conductor composed of a triangular tube, A, with inwardly arched sides, in combination with a continuous central iron wire, C', extending partly or wholly through the length of the tube, substantially as and for the purpose herein set forth.

47,311.—Manufacture of Friction Matches.—Stefan Kackowizer, New York City:

I claim the formation of a metallic skin around the friction or phosphoric mass of matches consisting of sulphide of lead, substantially in the manner above described.

47,312.—Chandelier.—Peter Loth, New York City:

I claim, First, A chandelier and central adjustable drop light combined as a new article of manufacture.

Second, The chamber, b c g, in combination with tubes and pipes, d' e j, arms f and h, and balance weight, k, or their equivalents, all constructed and operating substantially as and for the purpose set forth.

47,313.—Deoderizing Coffin.—Alfred E. Lyman, New York City:

I claim the deodorizing machine of the crooked or angular form, for the purposes herein described and substantially set forth.

47,314.—Fastening for Blocks of Shoe Last.—Daniel Lynahan and Harry H. Kock, Buffalo, N. Y.:

We claim the improved device for fastening the blocks to shoe lasts consisting of the revolving hooked bolt, b, and spring, e, or its equivalent, arranged and operating substantially as described.

47,315.—Mechanical Movement.—Wm. C. McGill, Cincinnati, Ohio:

First, I claim the arrangement of shaft, A, ratchet wheel, C, geared levers, D D', and pawls, E E', combined and operated in the manner set forth.

Second, The arrangement of shaft, A, duplex reversed ratchet wheel, C, geared levers, D d and D d', and reversible duplex pawls, E'' and E''', combined and operating as represented.

47,316.—Manufacture of Gun Cotton and Lint.—James P. McLean, Brooklyn, N. Y.:

I claim the introduction and use of the asclepias, or milk-weed fibers, N N, figures 1 and 2, for the manufacture of a new article of gun cotton, also for lint, either from the fiber itself or from the fabric or yarn made of the fiber, as above set forth.

47,317.—Cartridge for Small Arms.—David M. Mefford: Cincinnati, Ohio:

I claim the combination of the wood case, A, the binding cord, f, the metal cap, e, and the fuse tube, D, for explosive cartridges as herein described, for the purposes set forth.

47,318.—Dusting Brush.—C. Mason Moody, Greenfield Mass.:

I claim a dusting brush composed of a series or bundle of flexible or elastic quills or supports, A, to which any suitable soft flossy or fibrous material is attached, substantially as herein shown and described.

[This invention relates to a peculiar mode of forming a dusting brush, to be used as a substitute for the ordinary "feather duster," so called, it being much cheaper, and possessing nearly the same flexibility and softness.]

47,319.—Printing Press.—Richard W. Moran, St. Louis, Mo.:

First, I claim the combination in a single printing press of two independent type cylinders, B B', and corresponding impression cylinders, H H' and J J', with each other and with independent systems of tape rollers and endless tapes, substantially as herein set forth, whereby two separate rolls or sheets of paper may, in passing simultaneously through the press, both receive on each side opposite impressions from each type cylinder.

Second, I also claim the within-described combination of distinct galleys, g g, with the turtles, E E, of a printing press when the same are constructed and arranged substantially in the manner and for the purpose herein set forth.

47,320.—Bean Harvester.—D. B. Munger, Mumford, N. Y.:

First, I claim the cam guides, g, in combination with the puller heads, H, substantially as and for the purposes set forth.

Second, In combination with the cam guides, g, and puller heads, the springs, S, or their equivalents, for the purposes specified.

47,321.—Apparatus for Manufacturing Sugar Wine and Oil from Sorghum.—Isaac Myers, Pisgah, Ohio:

I claim the arrangement, construction and combination of the oblong furnace, A, adjustable molasses pan, J, finishing pan, N, boiling water pan, P, with its steam condenser, R, all as herein described and for the purposes herein set forth.

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47,322.—Tackle Hook.—Joseph W. Norcross, Middleton, Conn.:

I claim the band, B, passing around the neck and point of the hook and secured to the latter, in the manner herein set forth.

[The object of this invention is to overcome two of the principle difficulties experienced in the use of the common hooks, etc., viz.: the straightening of the hook and the spontaneous unhooking of the same.]

47,323.—Tension Pulley.—A. B. Nimbs, Buffalo, N. Y.:

I claim, first, Supporting the tension pulleys, B, in a frame, A, of cast iron, having in itself sufficient weight to give the required tension to the belt, substantially as described.

Second, The combination of the spherical sleeve, C', within which the straight journal of the shaft runs, with the spherical socket, C, for the purposes and substantially as set forth.

Third, Supporting the tension pulleys, B, in the frame, A, by means of journal boxes, C C', made capable of adjustment to bring the tension pulley shafts in line with that of the driver, without such adjustment causing them to bind the journals running therein.

47,324.—Traveling Lunch Bag.—John H. Noyes, Oneida, N. Y.

I claim a combined traveling bag and lunch box or receptacle, with or without the pocket, constructed and arranged as herein set forth.

[This invention consists in combining with a traveling bag a lunch box or receptacle and also a pocket, if desired, all being constructed and arranged in such a manner that the necessary clothing of a traveler, letters and papers, and also provisions or lunches, may be carried in one device with equally as great facility as clothing alone, can be carried in the ordinary traveling bags.]

47,325.—Lock.—Henry Oaks, Waynesboro, Pa.:

First, I claim the hooked detachable hasp, I, in combination with the bar, D, the expanding jaws, J J', and spring, K, substantially and for the purpose described.

Second, The combination of the expanding jaws, J J, and spring, K, with the drawing and thrusting bars, L M, operated respectively by the bits, R S, on the key, as described.

Third. The key, Q, with the operating bits, R S, as described, and the supplementary safety bits, T, located on the shank relatively to a notch in the side of the passage way occupied by the shank in unlockings nd affording a means of adapting each key to a specific lock as described

47,326.—Thrashing Machine.—S. E. Oviatt, Richfield, Ohio:

I claim, first Discharging the blast from the case, K, above the thrashing cylinder through a pipe or flue upon the separating carrier between the thrashing cylinder and the tail board, for the purpose of bearing down the straw upon the separating carrier and of forcing the same along without clogging as well as for clearing the front of the machine from dust, substantially as and for the purpose described.

Secoud, Hinging the stocker to the rear end of the thrashing machine in such a manner that is perfectly free to be elevated or depressed on said hinge without chang ng the relative positions of the pulleys, D and D', which operate the elevator belts of the stocker, substantially as and for the purposes described.

Third, I claim the braces, I I, in combination with the carrier, C C, and S, as described.

Fourth, I claim the grain box, F, with the inclined planes, G G, and gates, F, so arranged as to draw the grain from either side of the machine, as herein specified.

47,327.—Foot Warmer.—Charles Palmer, Brookline, Mass.:

I claim a foot warmer, consisting of a receptacle, B, for holding sand upon the surface of which the gas is burned and a box or casing, A, provided with a perforated foot rest, substantially as described.

47,328.—Air Compressing Apparatus.—John S. Patrie, Victor, N. Y.:

I claim, first, The combination of the floats, F and F', and the diaphragm, d, with the inlet and outlet water valves, a, and E and E', all the parts being arranged and operating within the air and water chamber,

Second, Operating the water valves, a and E, by the bar, s, which is connected to the flexible diaphragm, d, substantially as set forth.

Third, The combination of the floats, F and F', with the jointed levers, f and f', arranged and operating substantially in the manner and for the purpose shown and described.

47,329.—Hog Tamer.—Theodore G. Pelton, Lyons, Iowa:

I claim the slotted spring, e, the slotted jaw, a2, the grooved jaw, a, with its gage, B, the barbed wire, m, of steel or iron, all for the purpose as above set forth.

47,330.—Horse Carriage.—Robert Perrine and Samuel M. Stewart, Rochester, N. Y.:

We claim the construction and arrangement of the cranes, B, and the box, C, and their connection with the same springs, h, by means of the joints, G, or equivalent, substantially as and for the purposes herein set forth.

47,331.—Machine for Tempering and Preparing Peat.—Nath'l F. Potter, Providence, R. I.:

First, I claim the use of a series of combing teeth, a a a, or their equivalents, operating upon the mass of peat to remove the undecomposed vegetable fiber, in the manner and on the principle substantially as described.

Second, The combination of a brush or a series of brushes, O, or clearers with the combing teeth, a a a, substantially as described for the purposes specified.

Third, The employment of a series of comb teeth, N, arranged substantially as shown, in combination with the brush or series of brushes, O, for the purposes described.

Fourth. The method substantially as described, of separating the vegetable fiber from a mass of crude peat and transferring the same to a pl ce where it can be removed by the combination of the movable set of comb teeth, a o a, the stationary set of comb teeth, N, and the clearing and delivering brushes, O, as herein set forth.

Fifth, The use of a receiving trough, G, or its equivalent, provided with the Archimedean screw K, arranged and operating to receive the refuse vegetable material extracted from the peat and to deliver the same to suitable receptacle, as de-cribed.

Sixth, The combination of such receiving and delivering apparatus with the apparatus for extracting and transferring the refuse vegetable material to the same, as herein described.

47,332.—Cultivator.—T. J. Potts, and P. C. Yost, Hamilton, Ill.:

We claim the lever, L, fitted in the slotted bar, M, and connected at its rear to a cross bar, J, attached to the standards, e, at the rear of each beam, the front end of said lever being fitted between the prongs, h h, of a foot lever, N, and all arranged to operate in the manner substantially as and for the purpose set forth.

[This invention relates to a cultivator of that class in which the driver may ride upon the machine and operate or adjust the plows; it also consists in the means employed for operating the plows, whereby it is believed that a simple and efficient cultivator is obtained and one which may be operated with the greatest facility and possess no parts which are liable to get out of repair.]

47,333.—Apparatus for Separating Fish Oil from Water and other Impurities.—Thomas L. Robinson, Boston, Mass.:

I claim, first, Automatically separating and purifying oils from all extraneous matters and liquids contained therein, by means of an apparatus arranged and operating substantially as herein described.

Second Forming the oil vessel, b b, with heads or ends of a conical shape, substantially as described and for the purpose specified.

Third. The use of the peculiar-shaped nozzle or sprinkler, z, for the delivery of water to the oil vessel, b, arranged and operating substantially as described and for the purposes specified.

Fourth, Dividing the oil vessel, b b, into two or more chambers, having communication with each other for the purpose of preventing the violent upward agitation of the oil, substantially as described.

Fifth, The apparatus herein described for separating and purifying oils from extraneous and refuse matters and liquids the same consisting of the double-headed conical shaped vessel, b b, oil pipes, o o and r r, water pipes, h and p, and sprinkler, z, or their equivalents, the whole being arranged together and operating substantially as described.

47,334.—Carriage.—Elisha Robbins, Worcester, Mass.:

I claim as my invention the application of the axle to the cart body, so as to be capable of moving underneath and with reference to such body, in manner as described, and connecting the axle with the thills, and the latter with the body by mechanism, substantially as specified.

And in combination with the axle, so applied to the body and thills, I claim the rack and pendulous double catch, or the equivalents thereof, such being applied to the body and axle, substantially as and to operate as described.

I also claim the combination of the tongue, e, and the eye or clasp, f, or their mechanical equivalents, with the axle applied to the cart body and the thills, in manner and to operate substantially as explained.

47,335.—Powder for Lighting Segars, Etc.—Charles William Roesling, Cleveland, Ohio:

I claim the composition prepared substantially as set forth, for the purpose specified.

47,336.—Achromatic Object Glass for Photographic Cameras, Etc.—Hermann Roettger, Philadelphia, Pa.:

I claim the construction of an achromatic object glass, composed of four lenses—two of crown glass and two of flint glass, cemented to compose one o ject glass for telescopes, as well as for other purposes in the manner shown and described

47,337.—Artificial Fuel.—Julius Augustus Roth, Philadelphia, Pa.:

I claim the impregnation of the solution of lime with sulphurous acid obtained from coal or other sulphate, for the purpose of conglomerating the waste coal dust, and thereby producing a solid full, substantially set forth in my specification.

47,338.—Reel for Harvester.—E. P. Russell, Manlius, N. Y.:

First, I claim constructing the shafts of harvester reels in two pieces, S' S2 or their equivalents, operating substantially in the manner and for the purpose specified.

Second, The clamps, I, constructed, applied and operating substantially as and for the purposes herein specified.

47,339.—Graining Instrument.—William Russell, Beloit, Wis. Antedated Dec. 14, 1864:

I claim, as an improvement in a graining machine or tool, the curved-shaped pieces of wood, B B, or any other available material, divided in sections, and attached to the solid piece, A, and made with screws and springs adjustable, and made of brass, iron, rubber or any other proper material, the whole in combination and for the purpose set forth.

47,340.—Leather Shoe String Cutter.—J. A. Safford, Boston, Mass.:

I claim, First, The circular cutter, C, with a tangential opening and a cutting end, h, substantially as set forth and for the purpose described.

Second, The employment of the spring, J, or its equivalent, within the circular cutter, C, substantially as and for the purpose described.

Third, Rendering the tangential opening or throat adjustable, substantially as and for the purpose described.

Fourth, The tangential wing or cutter, i, substantially as set forth and for the purpose specified.

47,341.—Heel-trimming Machine.—Joseph F. Sargent, Boston, Mass.:

I claim the combination of a pattern block with a heel-cutting or trimming mechanism, when the block is so arranged and is of such form as to serve as a pattern for trimming heels of different sizes and contours, substantially as set forth.

Also, A mechanism so organized that the size and form of the heel are determined by the size of the shoe and patterns or pattern block, substantially as set forth.

Also, The combination of the jaws, l, arm, i, inclines, h, and pattern block, arranged to operate together, substantially as specified.

Also, The employment of an adjustable or spring last pin, in connection with a clamping mechanism, substantially as described.

Also, The auxiliary roll, r, in combination with the pattern roll, for giving the proper angle of presentation to the stationary knife, g.

Also, The arrangement of a shoe in a yoke with the heel, centered with respect to the post which carries the pattern, and so as to be held toward and rotated with respect to the cutting mechanism, substantially as set forth.

Also, The arrangement of the mechanism by which when the joint between the heel and vamp is irregular the shoe shall have a corresponding vertical movement given to it, as set forth.

47,342.—Railway Car Seat.—Geo. W. Sayre, Pisgah, Ohio:

I claim the arrangement, construction and combination of the up right ends, G, of the bar, E, notched lever, M, and adjustable flat spring, J, as herein described and for the purposes set forth.

47,343.—Machine for Covering Wire.—T. S. Sperry, New York City:

First, I claim in a machine for covering wire with wire, making the main wire self-feeding by means substantially as herein described.

Second, The smooth projection, d, on the end of the hollow spindle, C, in combination with one or more guides, c, or equivalent therefor, or the disk, F, which carries the spools containing the covering wire, substantially as and for the purpose shown and described.

[This invention relates to an improvement in that class of machines which are used for the purpose of covering wire of inferior metal with thin wire of some more costly and non-corrosive metal, and the engraved machine is intended to be used particularly for covering skirt wire, but it can also be used for wire of any other description, flat or round.]

47,344.—Pump.—N. Sutton, Detroit, Mich. Antedated April 3, 1865:

I claim the combination and arrangement of the eccentric gearing with the piston rods, C D, substantially as and for the purpose specified.

I further claim the stuffing box, E, when applied to the upper bucket or piston, B, and used in combination with the solid and tubular piston rods, C D, substantially as and for the purpose set forth.

47,345.—Carding Machine.—Daniel Tainter, Worcester, Mass.:

First, I claim the combination with the main frame of a machine for carding wool or cotton of a supplemental hinged or swinging frame for supporting the feed rolls, burr and leading in cylinders, substantially as and for the purposes described.

Second, The combination with the hinged frame, H, of the pivoted hook, b, or its equivalent, with the pin, c, on the main frame, substantially as and for the purposes specified.

Third, Mounting the burr cylinder and feed rolls on a hinged frame, whereby said cylinders and frame can be lowered or removed from the main cylinder, substantially as and for the purposes described.

Fourth, Mounting one or more of the small cylinders which assists in conveying the fibrous material to the main carding cylinder of a wool or cotton-carding machine upon a hinged swinging frame, whereby the latter can be expeditiously lowered or removed from the main cylinder, for the purpose of clearing, grinding or repairing said cylinders, or to make room for the easy removal of other cylinders, substantially as herein described.

47,346.—Grain Separator.—B. F. Trimmer, Rochester, N. Y.:

I claim a draught passage, D, of sufficient transvese dimensions to enable a draught proportioned in amount to the quantity of grain passing through it, to be employed and arranged so as to diffuse or concentrate the draught uniformly upon the falling grain, according to the kind, quality or condition thereof, and at right angles, or nearly so, thereto; and in combination therewith a valve, L, and board, K, or its equivalent, arranged so as to properly separate the sound grain from the refuse, as the intensity of the draught, or the kind or condition of the grain varies, substantially as herein specified.

Second, In combination with the board, K, having a passage for the draught both above and below, and with the pocket, I, I also claim the valve, N, so arranged as to cut the passage off entirely at the top and force it to pass downward through the pocket, or to allow the passage at the top, substantially as described.

Third, I also claim the adjustable board, H, arranged in combination with the mouth, a, of the space, D, in such a manner as to contract or concentrate the draught upon a particular portion of the falling stream of grain, or to diffuse it through said space, substantially as described.

Fourth, I also claim a series of two or more pockets, I I', in combination with the screws, S S S, beneath, in such a manner the contents of said pockets will fall on said screens, and mix with the main portion of grain through sprout, F, and so that the pockets, I', that contain the greatest amount of refuse with the smallest amount of sound grain, shall pass over a shorter space of the screens, substantially as described.

Fifth, I also claim the combination and arrangement of the tilting board, W, with the pocket, P, screens, S S, tube, T, and discharge pipe, p, in such a manner as either to discharge the contents on said screen, or into said spout, substantially as herein set forth.

Sixth, I also claim the combined construction and arrangement of the tubes, T U, provided with the valves, t t'', at their upper ends, and having the grain crossing the lower ends from the screens, by means of the chutes, q s, as and for the purposes herein described.

Seventh, In combination with the shoe, P, I also claim the spring standards, Q Q', those in the rear being raised or lowered by means of the rock bar, k, and pinion, l, in such a manner as to adjust the angle of the shoe, said shoe being operated by the spring pitmens, R R, the whole arranged and operating substantially as and for the purpose herein set forth.

Eighth, I also claim the removable section, S', and the slide, S'', of the screens, S S, arranged in relation to said screens, and the shoe, P, in such a manner that the end of the shoe may be opened to allow the cleaned grain to fall directly through, substantially as described.

Ninth, I also claim, in combination with the section, S', of the screen, provided with enlarged perforations, the slide, u, substantially as and for the purpose herein set forth.

47,347.—Reservoir for Beer, Wine, Etc.—Mathew Tschirgi, Dubuque, Iowa:

I claim, First. The employment of subterrene structures for the purpose of storing beer and other fermentable liquids, which are constructed of masonry, and rendered impervious to air, substantially as described.

Second, Providing reservoirs of masonry, which are adapted for storing beer and other liquids, with feed pipes, gages and man-holes, substantially as described.

47,348.—Suspenders.—Albert W. Upton, Lowell, Mass.:

I claim the improved suspenders as made with the single elastic dorsal strap, b, arranged and combined with the shoulder and back buttoning straps, substantially in manner and by means as specified and as represented.

47,349.—Lock for Piano-forte.—Sylvenus Walker, New York City:

I claim a lock, constructed with the diagonal movement of the bolt, B, substantially in the manner and for the purposes set forth.

47,350.—Breech-loading Fire-arm.—Albert M. White, Port Chester, N. Y.:

I claim operating the latch which holds the lock frame in position in the receiver, by means of the trigger, substantially as above described.

Second, I also claim elongating the slot in the trigger which receives the joint pin, r, of the latch, in a vertical or nearly vertical direction, so as to permit the trigger to have a vertical downward movement, when it is pushed forward to draw the latch, substantially as above described.

Third, I also claim elongating the slot, c, of the fulcrum, J, horizontally to permit the trigger to move horizontally forward when unlatching the lock frame, substantiantially as described.

Fourth. I also claim the combination of the vertically-elongated slot, q, and the horizontally-elongated slot, c, as arranged to permit the —— and the trigger to have a vertical, horizontal and rotary motion, when the latch, G, is thrown forward to release the lock frame, substantially as described.

Fifth, I claim the spring cartridge shell drawer, connected with the swinging breech-piece or lock frame, by means of a pin, h, and slot or lock, i, in such manner as to preserve the connection while the pin, h, moves in a circle concentric with the pin, J, on which the breech swings, and the said drawer moves parallel, or nearly so, with the bore of the barrel, substantially as herein described.

Sixth, I claim so combining and arranging the hammer and the trigger in a swinging breech piece or lock frame, that the two may form arms of a three-armed lever, of which the attachment of the cartridge shell drawer forms the third arm, and of which the pin on which the trigger works is the fulcrum, whereby with the thumb in front of the comb of the hammer, and the fingers behind the trigger, the whole power of the hand may be applied to withdraw the cartridge shells from the barrel, substantially as herein specified.

Seventh, I claim the sliding latch, G, and the stop, a, in combination with each other, as described, as a means of forming a rigid connection between the hammer and trigger, whereby they are made to serve as two arms of a lever, for the purpose of withdrawing the cartridge shell.

47,351.—Harvester.—Benjamin Wieland, Orangeville, Ill.

I claim the combination of the adjustable platform, D, uprights, B, and the endless sickle, constructed as described, and operated through the medium of the spur wheel, q, pinion, p, bevel gearing, o m, shaft, F, and polygonal pulley, as described and represented.

47,352.—Pad-lock.—Daniel T. Brown, Newton, N. Y., assignor to James H. McWilliams, New York City:

I claim, First, A compound tumbler, f, swinging upon the bolt, d, and acting in the manner specified, to retain the tumblers when unlocked, substantially as specified.

Second, I claim projecting the bolts by the action of the spring, compound tumbler and inoline, 4, substantially as specified.

47,353.—Artificial Leg.—Theodore Burr, Battle Creek, Mich., assignor to himself and Smith M. Kellogg:

I claim, First, The segment, C, constructed with the plates, c c, and otherwise, substantially as described, for the purpose set forth.

Second. The combination of the parts, F G r, constructed and applied so as to form a knife-edge joint, substantially as described.

47,354.—Knitting Machine.—A. C. Carey, Malden, Mass., assignor to Samuel A. Bradbury, Dorchester, Mass.:

I claim, First, A knitting machine, so constructed as to be capable of knitting the closed end or tip of a stocking, or other tubular article, in the manner and by the means substantially as described.

Second, The combination of the two rows of needles, in each of which every needle acts independently of the others, with the inclines, A and A', and the jack, E, as and for the purpose substantially as herein described.

Third, I also claim the ring gear, R, in combination with the moving arms, p and p', the crosshead, a, the slide, s, thread guide, g, and the inclines, A A', substantially as and for the purpose described.

Fourth, I also claim the jack, E, for the purpose of pushing forward successively the needles of the right or left hand row, while those of the other row are forming the loops preparatory to knitting, substantially as described.

Fifth, I also claim the snail wheel, N, in combination with the arms, L L, and the levers and connections by which it operates said arms. I also claim the self adjusting compound weight, as and for the purpose herein described and represented.

Sixth, I also claim, in combination with a jacquard chain or pattern that has at times a revolving or forward motion independent of its frame, and at times an uniform backward and forward motion with its frame, a series of adjustable weights that are in active operation when the chain has its forward or rotary in connection with its backward and forward motion, for the purpose of widening the work as it is being knitted, and that are in passive operation only when the chain has only an uniform backward and forward motion for continuing the work of uniform size or width, substantially as described.

47,355.—Smoke Houses.—William Hamilton (assignor to David Carlisle), St. Louis, Mo.:

I claim the constructing the fire-box, A, outside of the smoke house, in connection with the smoke chamber, B, inside of the house, and the openings, t, and the plate, x, substantially as described.

47,356.—Shoe Fastening.—Charles B. Hatfield (assignor to Charles Eugene Woodman), Boston, Mass.:

I claim the combination of the catch, f, and its socketed plate, C, or their equivalents, with a buckle or strap holder.

I also claim the arrangement of the pointed tongue, b, and the larger or plate tongue, g, and the buckle frame, a.

I also claim the combination and arrangement of the pointed tongue, g, with the buckle frame, a, the catch, f, and its socketed plate, C, or their equivalents.

I also claim the catch socket recess, k, and its mouth, l, as made with reference to the shank of the catch, and arranged substantially as described.

47,357.—Automatic Stop Motion for Steam Engines—John Jackman, Jr. (assignor to the American Automatic Stop Motion Company), Newburyport, Mass.:

I claim the combination of a spring, d or d', and button, e or e',

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with the rod, a, or its equivalent, and with the trip lever. B, or inclined planes. B', or their equivalents, and with the governor, A' substantially as and for the purposes herein shown and described.

47,358.—Automatic Stop Motion for Steam Engines.—John Jackman, Jr. (assignor to the American Automatic Stop Motion Company), Newburyport, Mass.:

I claim the sleeve, D, connected to the rod, C, of a governor, and locked to the same by a dog, a, in combination with a spring, d, and button, e, constructed and operating substantially as and for the purpose set forth.

47,359.—Automatic Stop Motion for Steam Engines.—John Jackman, Jr. (assignor to the American Automatic Stop Motion Company), Newburyport, Mass.:

I claim, First The spring, H, applied in combination with the rod, I, arms. J, catch bars D D, or their equivalents. governor, A, and with a suitable stop, substantially as and for the purpose set forth.

Second, The adjustable cam, c, with an inclined plane, in combination with the lever, K, notched disk, b, spring. H, rod, I, with arms, J, and with the governor and catch bars, or their equivalents, constructed and operating substantially as and for the purpose described.

[The invention which forms the subject of these three patents was profusely illustrated and described on pages 95 and 96 of the current volume.]

47,360.—Detachable Horse Shore Calks.—Charles H. Johnson (assignor to Himself and Chas. Eugene Woodman), Boston, Mass.:

I claim the arrangement and combination of the two tenons, c c, and their mortises, b b, or b' b', on opposite parts of the calk and flange, with the shoe, the calk and the flange.

I also claim the combination of the relievo and incavo crosses, f g, or their equivalents, with the calk, the flange, and the tenons and mortises of the calk and shoe.

I also claim the combination of the lateral recess, d, on the flange, and its corresponding projection, e, on the tenon, with the calk tenon, and flange applied to the shoe, substantially as specified.

I also claim the arrangement of the fastening screw, h, viz., so as to pass through the shoe and through the tenons, as set forth.

47,361.—Apparatus for Stirring and Cooling Lards.—Alonzo R. Judson, (assignor to Himself, E. H. Clark) New York City and James D. Gray Brooklyn, N. Y.:

I claim the combination of the cranks, H H, vertical shafts, C C, radial arms, D D, and stirrers, F G, all constructed and arranged as herein described so as to oscillate the said stirrers simultaneously in horizontal planes and in opposite directions, as explained.

[This invention relates to a new and improved device for cooling lard, and it consists in the employment or use of two oscillating frames or stirrers, arranged uprightly in a vat, whereby lard may be stirred and cooled very expeditiously, and with but a very moderate expenditure of power, as there is but little friction attending the working parts of the device.]

47,362.—Regulator for Gas Burners.—Wm. Mallerd (assignor to J. D. Alvord), Bridgeport, Conn.:

I claim the employment of the independent ring in combination with the inner case and the diaphragm, substantially as herein shown and described.

I also claim the combination of the diaphragm regulator with the diaphragm, substantially as herein shown and described.

I also claim the combination of the said diaphragm regulator with the adjustable valve, substantially as herein shown and described.

[This invention relates to a novel mode of securing a flexible diaphragm within the regulator, whereby its edges are entirely prevented from being cut or worn as it is used, and also in a peculiar arrangement of devices for adjusting the regulator according as it may be desired to allow more or less gas to pass through it to the burner.]

47,363.—Lining Petroleum Barrels, etc.—Thomas Oliver (assignor to Himself and Wm. H. Farrar), Oregon:

I claim, First, A preparation composed of the juice of the prickly pear, or other gelatinous plants, mixed with lime, plaster of Paris, flour, bran, or other similar substances, as a priming or preliminary application to the inside of barrels or other vessels, as and for the purposes set forth.

Second, The combination of a first and second application to the inner surfaces of barrels or other vessels, as described.

Third, The application of the ingredients herein described, when incorporated in one composition, and applied substantially as and for the purposes herein set forth.

47,364.—Fruit Picker.—Benjamin C. Phelps, Wethersfield, Conn., assignor to himself and Frederick H. Williams, Hartford, Conn.:

I claim a vertical blade, C', upon the shank, D, in combination with the vibrating spring lever blade, F H C, basket, B E, handle, A, and cord, G, when constructed and arranged substantially as described.

47,365.—Low Water Indicator for Steam Boilers.—G. Adolph Reidel, Philadelphia, Pa.:

I claim, First, The oscillating receiver, C, combined and arranged with the boiler, A, substantially as described and for the purposes specified.

Second, The jointed pipes, D and E, arranged and operating substantially as described.

Third, The combination of the weighted lever, H, with the receiver, C, substantially in the manner described and for the purpose set forth.

Fourth, The combination and arrangement of the conical valve, N, and whistle, O, or other alarm, substantially as described.

47,366.—Trace Connection.—John E, Seavey, assignor to himself and Edward S. Hutchins, Kennebunkport, Maine:

I claim as my invention the breeching or trace connection as composed of the eye, a, the shank, b, the head, c, the spring, C, the head, g, the passage, d, the notch, e, and the screw, f, or the equivalent of the latter, the whole being arranged substantially as and so as to operate as specified.

47,367.—Lubricator.—Francis Bresson, Paris, France:

I claim the combination of the air-tight vessel, A, with pipes, b c and I, substantially as and for the purpose specified.

I also claim the combination of the air-tight vessel, A, and stopper, B, and pipes, b c and I, substantially as and for the purposes described.

I also claim, in combination with the pipes, b c and I, when applied to the vessel, A, the vessel, A, the concave cap, e, substantially as and for the purpose described.

47,368.—Method of rendering Doors and Windows Water Tight.—William C. Fuller, London, Great Britain. Patented in England Feb. 16, 1864:

I claim the employment of a rib, strip or bead of elastic India-rubber, chemically united to a harder surface, whether of vulcanite or brass, as herein set forth and described.

47,369.—Winding and Setting Watches.—George Gondelfinger, Seloncourt, France, and J. Louis Bichet Besancon, France:

We claim, First, Combining with the wheels, H and H', which respectively control the movements of the watch hands and of the winding devices, a movable double pinion, F, upon a stationary shaft, which pinion can be set in and out of gear with either of said wheels, substantially as and for the purposes described.

Second, The combination with the wheels, H and H', of the movable pinion, F, stationary shaft, A, and spring clutch lever, G, substantially as and for the purposes specified.

47,370.—Winding aud Setting Watches.—Charles Eugene Laederich, St. Imier, Switzerland:

I claim the above described arrangement and operation of the stem and its pinion with the train and other wheels, for the purposes and in the manner substantially as described and illustrated in the drawings.

47,371.—Horse Rake.—James M. Jay (assignor to W. H. Alexander & Company), Canton Ohio:

I claim, in combination with the bar, D', and rake head, d, the S shaped hangers, a, so arranged that the bars will swing into one of the curves of the hanger and the rake head into the other, substantially as and for the purpose described.

47,372.—Breech-loading Fire-arm.—William H. Elliot, Plattsburg, N. Y.:

First, I claim a brace which receives the recoil of the breech plate and communicates it to the frame or other portions of the arm, independently of the pivot or bearing of the hammer, when said brace is operated by the hammer substantially as herein specified.

Second, The arrangement of the brace, e, between a hammer and main spring, when said hammer and brace swing upon separate pivots, substantially as herein described.

Third, Operating the brace, e, by means of a hammer which is pivoted to a breech plate, substantially as herein specified.

Fourth, The employment of lock notch, w, for locking the brace out of the way of the breech plate, substantially as set forth.

Fifth, So arranging the full cock notch, v, upon the hammer that that the brace, e, will still support the breech plate when he hammer is cocked for firing, substantially as herein shown and described.

Sixth, Passing the pivot of the hammer through the hubs of the breech plate, substantially as and for the purpose described.

Seventh, The combination and arrangement of the auxiliary spring, i, the half cock notch, u, and trigger, h, substantially as and for the purpose set forth.

47,373.—Car Springs.—G. Adolph Riedel (assignor to A. Merritt Asay), Philadelphia, Pa.:

I claim, First, The tubes, J, combined with the head plates, A B, and arranged and operating in relation to the springs, C F, substantially as hereinbefore described, and for the purpose set forth.

Second, Combining and arranging the spring, C, with the tube, J, substantially in the manner and for the purpose above set forth.

Third, Constructing the combining spring, G, of a twin shape bar or plate, substantially in the form represented in Fig, 4, when operated as described for the purpose set forth.

47,106.—Instrument for Cutting Potato Seedlings.—W. P. L. Herr, Brooklyn, N. Y. Dated April 4, 1865.:

I claim a scoop or cutter constructed substantially as shown in Fig. 2, for the purposes herein described.

REISSUES.

1,934.—Wringing Machine.—Selden A. Bailey, Simeon S. Cook and Benedick M. Cook, Woonsocket, R. I., assignees by mesne assignments of John Allender, New London, Conn. Patented January 11, 1859. Reissued June 28, 1864, and Nov. 8, 1864:

First, We claim a roller made of a spirally-coiled spring, arranged on a shaft or roller made smaller at the center than at the ends, as and for the purposes specified.

Second, A roller so constructed as to yield more at its center than at or near its ends, covered with vulcanized rubber or any other elastic compounds impervious to water, substantially as and for the purpose set forth

Third, Cog wheels, in combination with rollers of vulcanized rubber, or any other elastic substaace, or compound impervious to water, for the purpose set forth.

Fourth, Rollers made of or covered with vulcanized rubber, or any other elastic substance, or compound impervious to water when used in combination with cog wheels, and a spring or springs around the shaft of the roller, for the purpose set forth.

Fifth, Rollers for washing or wringing machines made of or covered with vulcanized rubber or any other elastic substance, or compound impervious to water, when used in combination with adjusting spring or springs.

Sixth, Rollers for washing or wringing machines, made of or covered with vulcanized rubber or any other elastic substance or compound impervious to water, when used in combination with adjusting spring or springs, and screw or screws, to adjust the pressure to the springs and rollers.

1,935.—Corn Planter.—George I. Bergen, Galesburg, Ill. Patented Dec. 1, 1863:

First, I claim the combination in a seed planter of a front frame, carrying the seeding mechanism and a drop-man's seat, and a rear frame, carrying a coupling windlass and a driver's seat, with the slotted coupling, substantially as described, for the purposes set forth.

Second, Balancing the front and rear frames of a seed planter by a windlass, substantially in the manner and for the purposes set forth.

Third, The windlass, C, to balance the front and rear frames, or control the depth of planting in a seeding machine, or to regulate the weight of the tongue upon the team, as set forth.

Fourth, The combination of the chain, fastened to either frame, with the windlass, and running spirally around it, to vary the leverage, substantially as described and set forth.

Fifth, Revolving seat for the drop-man, combined with a seed-planter, constructed and operating as and for the purpose described.

Sixth, The combination of the drop-man's seat with the driver's seat, and with the windlass, substantially as described and for the purposes set forth.

Seventh, The indicating spring, with its ribs constructed and operating substantially as described.

Eighth, The slotted joint, connecting the front and rear frames when the draft of the rear frame is effected by this coupling alone, and so as to allow a vertical movement of the front or rear frame, as and for the purposes set forth.

Ninth, I claim locating the drop-man's seat in the rear of the heel of the runners, for the purpose of balancing the weight of the front part of the frame and the tongue, as and for the purpose set forth.

Second, I claim operating the seed slides by applying the power direct to the handle that moves the slide, without the use or intervention of a lever, as set forth.

1,936.—Revolving Fire-arm.—Wm. H. Elliot, Plattsburgh, N. Y. Patented Oct. 1, 1861:

I claim the combination of a chamber or chambers, which are left open at their rear end, for the purpose of being charged thereat with a hammer hung or pivoted forward of the rear end of said chamber or chambers, substantially as set forth.

1,937.—Revolving Fire-arm.—Wm. H. Elliott, Plattsburgh, N. Y. Patented Oct. 1, 1861:

I claim resisting the recoil of a cartridge case by means of a hammer, which is pivoted underneath and forward of the rear end of a chamber or chambers, substantially as herein set forth.

1,938.—Revolving Fire-arm.—Wm. H. Elliot, Plattsburgh, N. Y. Patented Oct. 1, 1861:

I claim the combination of a chamber or chambers which are bored through at their rear end and left open for the purpose of being charged thereat with a lock frame, which is extended forward of the rear end of said chambers, and a hammer pivoted or hung in the part of said frame so extended forward, substantially as and for the purpose set forth.

1,939.—Hay-elevating Fork.—Thomas F. Hisert, Greenville, N. Y., assignee of Thomas T. Jarrett, Horsham, Pa. Patented May 30, 1854:

I claim, First, The employment or use of a weight on the cord, attached to the catch, which shall operate to discharge the hay from the fork at any desired hight, substantially as and in the manner described.

Second, The combination of one or more pulleys with a hay-elevating fork, for the purpose described.

Third, The pulley, J, at the back part of the head, operating as and for the purpose described.

Fourth, Securing the handle or bail to the head by means of loop eyes, which are secured in the head and project therefrom.

Fifth, Securing the tongue or brace lever to the handle or bail by means of a spring catch attached to the said handle or bail, for the purpose described.

Sixth, A spring catch twisting upon a pin or bearing the functions of which, are to keep the tines or body of the fork in position to retain the load, and to discharge it whenever desired.

Seventh, In hay-elevating forks I claim the combination of the tines, the wooden head, the tongue or brace lever, and the spring catch.

Eighth, The combination of a spring catch with a rigid tongue or brace lever, extending from the piece which receives the tines, for the purpose described.

DESIGN.

2,054.—Letter-press Type.—Andrew Little, New York City.

PATENTS

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In connection with the publication of the SCIENTIFIC AMERICAN, have acted as Solicitors and Attorneys for procuring "Letters Patent" for *new inventions* in the United States and in all foreign countries during the past *seventeen years*. Statistics show that nearly ONE-THIRD of all the applications made for patents in the United States are solicited through this office; while nearly THREE-FOURTHS of all the patents taken in foreign countries are procured through the same source. It is almost needless to add that, after *seventeen years'* experience in preparing specifications and drawings for the United States Patent Office the proprietors of the SCIENTIFIC AMERICAN are perfectly conversant with the preparation of applications in the best manner, and the transaction of all business before the Patent Office; but they take pleasure in presenting the annexed testimonials from the three last ex-Commissioners of Patents.

MESSRS. MUNN & CO.:—I take pleasure in stating that, while I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE CAME THROUGH YOUR HANDS. I have no doubt that the public confidence thus indicated has been fully deserved, as I have always observed, in all your intercourse with the office, a marked degree of promptness, skill, and fidelity to the interests of your employers. Yours very truly,

CHAS. MASON.

Judge Mason was succeeded by that eminent patriot and statesman, Hon. Joseph Holt, whose administration of the Patent Office was so distinguished that, upon the death of Gov. Brown, he was appointed to the office of Postmaster-General of the United States. Soon after entering upon his new duties, in March, 1859, he addressed to us the following very gratifying letter.

MESSRS. MUNN & CO.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you discharged your duties as Solicitors of Patents, while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and I doubt not justly deserved) the reputation of energy, marked ability, and uncompromising fidelity in performing your professional engagements.

Very respectfully, your obedient servant, J. HOLT.

Hon. Wm. D. Bishop, late Member of Congress from Connecticut, succeeded Mr. Holt as Commissioner of Patents. Upon resigning the office he wrote to us as follows:

MESSRS. MUNN & CO.:—It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your agency; and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully, your obedient servant,

WM. D BISHOP.

THE EXAMINATION OF INVENTIONS.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a written reply, corresponding with the facts, is promptly sent, free of charge. Address MUNN & CO., No. 37 Park Row, New York.

As an evidence of the confidence reposed in their Agency by inventors throughout the country, Messrs. MUNN & CO. would state that they have acted as agents for more than TWENTY THOUSAND inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of inventors and patentees, at home and abroad. Thousands of inventors for whom they have taken out patents have addressed to them most flattering testimonials for the services rendered them; and the wealth which has inured to the individuals whose patents were secured through this office, and afterwards illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! Messrs. MUNN & CO. would state that they never had a more efficient corps of Draughtsmen and Specification Writers than those employed at present in their extensive offices, and that they are prepared to attend to patent business of all kinds in the quickest time and on the most liberal terms.

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The service which Messrs. MUNN & CO. render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there; but is an opinion based upon what knowledge they may acquire of a similar invention from the records in their Home Office. But for a fee of $5, accompanied with a model, or drawing and description, they have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a patent, &c., made up and mailed to the inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through the Branch Office of Messrs. MUNN & CO., corner of F and Seventh streets, Washington, by experienced and competent persons. Many thousands of such examinations have been made through this office, and it is a very wise course for every inventor to pursue. Address MUNN & CO., No 37 Park Row, New York.

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Persons who are about purchasing patent property, or patentees who are about erecting extensive works for manufacturing under their patents, should have their claims examined carefully by competent attorneys, to see if they are not likely to infringe some existing patent, before making large investments. Written opinions on the validity of patents, after careful examination into the facts, can be had for a reasonable remuneration. The price for such services is always settled upon in advance, after knowing the nature of the invention and being informed of the points on which an opinion is solicited. For further particulars address MUNN & CO., No. 37 Park Row, New York.

The Patent Laws, enacted by Congress on the 2d of March, 1861 are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

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Persons desiring to file a caveat can have the papers prepared in the

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P. B. J., of N. Y.—Heat may be produced by many chemical processes besides combustion. One of the most familiar of these is the pouring of water upon lime; the water enters into chemical combination with the lime, forming a hydrate of lime, changing from the liquid to the solid state, and giving up in the change its latent heat of fluidity. Where the quantity of lime is large the heat generated is sometimes sufficient to set wood on fire. The writer of this once lost some fifty barrels of lime by the burning of the barrels from this cause.

R. F. F., of R. I.—Locomotives have attained a speed of seventy miles an hour for a short time, but this is exceedingly rare, and is never done except for some special purpose; fifty miles an hour is not unfrequent where lost time has to be made up, but railway trains in this country, one with another, do not average over twenty-five miles an hour. There is undoubtedly a small per centage of slip in the driving wheels, but we are unable to say what the exact proportion is. The distance run in a given time and the revolutions of the driving wheels determine the amount of loss from this cause.

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I. B. R., N. Y.—No difficulty is experienced from using stoneware for cooking in if you heat the vessels gradually at first until they get tempered or annealed. A good way to do this is to put the stoneware into an iron pot full of cold water, bring it to a boil gradually and then cool slowly.

R. P. W., of R. I.—We have never seen an auger to bore a square hole, but we have seen a tool constructed with cutters which were drawn in after the circular bit has passed, so that a sort of square orifice was made. If you have anything new in this line we should be pleased to see it.

C. P. L., of Mass.—A "snell" or "snood" is the transparent sinew or gut used by fishermen to hide the connection between the line and hook; it is invisible in transparent water.

TO OUR READERS.

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This holder would make a good substitute for the old-fashioned "tags" used in the Post Office Department for directing mail bags. Travelers, market people, and express companies will find it very convenient and serviceable.

The inventor will receive proposals for the purchase of this patent or any part thereof.

For rights and all further information address the inventor, F. J. Collier, Canonsburg, Washington County, Penn., by whom it was patented Oct. 2, 1860.

Fig. 1

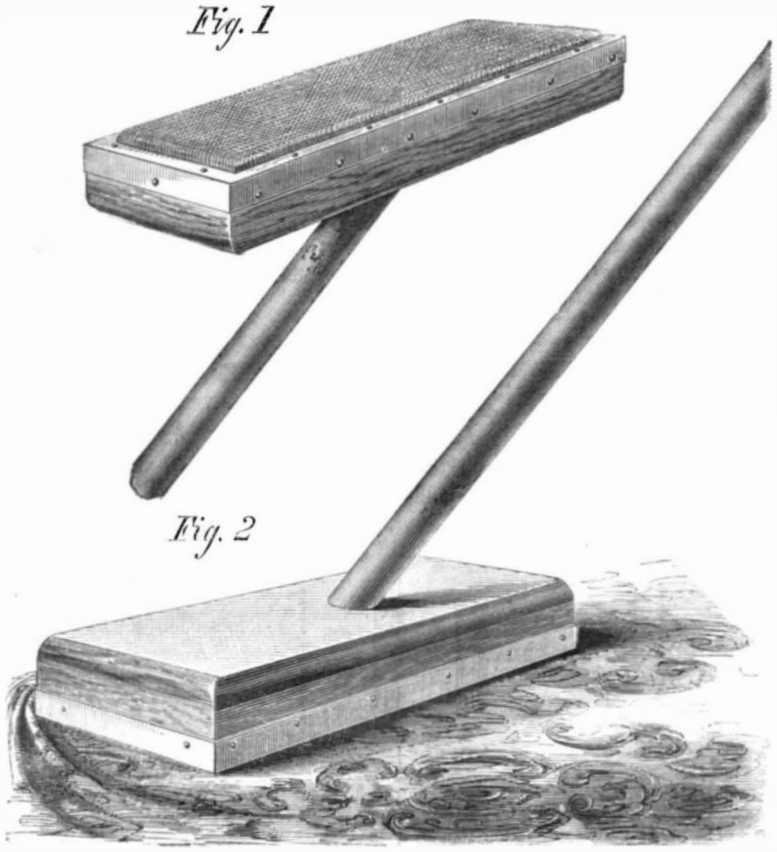

Fig. 2

COLLIER'S CARPET STRETCHER.

Fig. 1

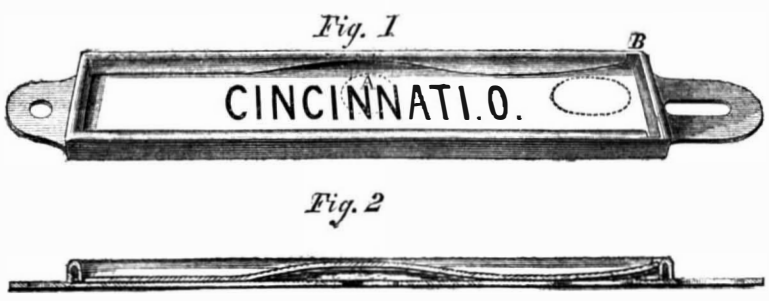

Fig. 2

COLLIER'S LABEL HOLDER.

Improved Label Holder.

This invention consists in providing a cheap, simple and durable holder for labels to secure them to any package, without the use of string or paste; exhibits the marks or direction plainly; protects the label from being rubbed, and also allows an easy and rapid change of one label for another of similar size and shape.

The holder is "struck out" of sheet metal, tin, zinc, or iron, and may be attached to any article by means of a cord, ring or staple. The loose end of the holder may be thrown over the staple of the padlock of the chest or mail-bag. The labels are made of elastic card-paper, and sold with holder. They may have directions written or printed upon both sides, and thus send a package back to the place whence it came.

In order to use this article, take the holder in the left hand, with the face up, and push the left forefinger through the center hole, A. This movement stretching is easily and rapidly done. This is a very neat and capital thing for the purpose.

Proposals for the manufacture of this implement or the purchase of the patent will be received by the inventor, F. J. Collier, at Canonsburg, Pa., by whom it was patented on the 21st of March, 1865, through the Scientific American Patent Agency.

The Mackay Gun.

The long-expected Mackay gun, manufactured at the Mersey iron and steel works, has at length arrived at Woolwich Arsenal, and was proved at the ordnance butt on Tuesday last. The gun was fired one round only, the charge being a cartridge of 50 pounds of powder, and a proof projectile of plain cast iron, with flat ends, weighing 336 pounds. Major Freeth, inspector of artillery, directed the proof, which was attended by Mr. Mackay on his own behalf, and Mr. Yates representing the manufacturers. On the usual test and examination made after each round, it was discovered that the plug at the end of the bore was set back by the force of the concussion, leaving a small space, two inches in depth, visible only to a practiced eye, but of considerable detriment in its present condition. The proof was consequently at an end. The defect, it is stated, will be made good, and the gun wtll be submitted to further proof. It weighs 10¾ tuns, is 14 feet long, with 8 inches diameter of bore, and is rifled with twelve grooves. The gun consists of a first solid forging from muzzle to breech, hooped over from the trunnions to the breech, the trunnions forming also a separate piece. The grooves, which are cut at a very sharp twist, are of the same depth and form as those used by Bashley Britten for firing lead-coated shot, and are termed "windage grooves," the gas passing through them.—*Engineer*, March 19.

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